SEPARATOR

54-00068

HAZ WASTE

COMPLIANCE

04/1992

NA

9545197

FACILITY INVESTIGATION
PRELIMINARY REPORT

CEDAR CHEMICAL CORPORATION
WEST HELENA, ARKANSAS

54-00d68

Prepared for
Cedar Chemical Corporation
Memphis, Tennessee

Prepared by
Environmental and Safety Designs, Inc.
5724 Summer Trees Drive
Memphis, Tennessee 38134
(901) 372-7962

April 1992

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1.0 INTRODUCTION

Cedar Chemical Corporation has agreed to conduct a Facility Investigation (FI) pursuant to the Consent Administrative Order (CAO) issued by the Arkansas Department of Pollution Control and Ecology (ADPC&E) for the Cedar Chemical facility in West Helena, Arkansas. The following preliminary report has been developed in accordance with the ADPC&E Scope of Work for a Facility Investigation (FI) included in the CAO as Exhibit A.

The purpose of the preliminary report is to provide a description of current conditions that exist at the facility. This description includes, but is not limited to, the history of the facility and its operations, a description of the site and its location, including all solid waste management units (SWMUs), and the nature and extent of any contamination that may exist at the site. The information presented in this preliminary report was obtained from Cedar Chemical personnel and records, existing reports and studies, regulatory information from EPA Region VI and ADPC&E, and site visits to the West Helena facility.

2.0 FACILITY BACKGROUND

The following section provides background information on the Cedar Chemical facility including a description of the location and physical features of the site and surrounding areas. A general history of the site is also included emphasizing the historical use of the facility for chemical manufacturing and treatment, storage and disposal of solid and hazardous waste.

2.1 Site Description

Cedar Chemical Corporation owns and operates a chemical manufacturing facility in Phillips County, Arkansas, just south of West Helena, Arkansas. The site consists of approximately 48 acres located on State Highway 242, one mile southwest of the intersection of U.S. Highway 49 and Highway 242. A topographic site plan of the facility including all site features and improvements, topographic contours and property boundaries is included in Figure 2-1. A geographic/topographic map of the area surrounding the facility is included in Figure 2-2.

The facility consists of five production units and support facilities, a newly constructed office building, and a biological treatment system. Active processes are conducted on approximately 20 acres of the site. The remainder of the site contains the biological treatment ponds and closed surface impoundments.

The site is located in the Helena-West Helena Industrial Park. It is bounded by Arkansas Highway 242 to the north, a Union-Pacific railway to the east and other industrial park properties to the south and west. The land north of Cedar Chemical across Highway 242 is

EnSafe Environmental and Safety Designs, Inc.
901/372-7962
5724 SUMMER TREES DR. • P.O. BOX 341315 • MEMPHIS, TN 38184-1315

April 10, 1992

Enforcement Branch Manager
Hazardous Waste Division
Arkansas Department of Pollution Control
and Ecology
8001 National Drive
Little Rock, Arkansas 72219

Dear Sir:

Environmental and Safety Designs, Inc. (EnSafe) is pleased to submit the revised Facility Investigation Preliminary Report on behalf of Cedar Chemical Corporation for their West Helena plant. This report was developed in accordance with Consent Administrative Order No. LIS 91-118 and all revisions are based upon the comments submitted by ADPC&E in the Notice of Deficiencies letter and the meeting at the ADPC&E office on February 27.

As discussed in the February 27 meeting, no revisions will be made to the Facility Investigation Workplan until we have received approval of the Preliminary Report. If you have any questions concerning this report please contact Mr. John Wagner at the Cedar Chemical Corporation in West Helena. Mr. Wagner can be reached at (501) 572-3701.

Sincerely,

Jeff Bennett

Jeff Bennett
Environmental Scientist

Enclosure

cc: Ms. Pat Crossley, ADPC&E
Mr. John Wagner, Cedar Chemical Corp.
Mr. Allen Malone, Apperson, Crump, Duzane & Maxwell

APPENDIX F
LIST OF SOLID WASTE MANAGEMENT UNITS

Solid Waste Management Units at Cedar Chemical Corporation.

SWMU #	Name	Active
1 & 2	Railroad Loading and Unloading Sumps	Yes
3	Railroad Loading and Unloading Sump	No
4	Production Areas #1 and #2 Drainage System and Sump	Yes
5	Production Area #3 Drainage System and Sump	Yes
6	Production Area #4 Drainage System and Sump	Yes
7	Production Area #5 Drainage System and Sump	No
8	Boiler Blowdown Area Sump #1	Yes
9	Boiler Blowdown Area Sump #2	Yes
10	Laboratory Sump	Yes
11	Sump Near Main Tank Farm	Yes
12	Maintenance Shop Drainage System and Sump	Yes
13	Truck Scale Sump	Yes
14	Packaging Building Sump	Yes
15-17	Air Emissions Scrubbers #01, #02 and #03	No
18	Air Emissions Scrubber #04	Yes
19	Sump in Main Tank Farm Diked Area #1 (North)	Yes
20	Sump in Main Tank Farm Diked Area #1 (South)	Yes
21	Sump in Main Tank Farm Diked Area #2	Yes
22	Sump in Main Tank Farm Diked Area #3	Yes
23	Waste Storage Tank PE-209 in Main Tank Farm Diked Area #4	Yes

Solid Waste Management Units at Cedar Chemical Corporation.

SWMU #	Name	Active
24	Waste Storage Tank 002 in Main Tank Farm Diked Area #5	Yes
25	Sump in Main Tank Farm Diked Area #6	Yes
26	Sump in Main Tank Farm Diked Area #7	Yes
27	Tank B-109 in Main Tank Farm Diked Area #7	Yes
28	Waste Storage Tank B-112 in Main Tank Farm Diked Area #8	Yes (In process of closure
29	Sump in Main Tank Farm Diked Area #9	No
30	Waste Water Storage Tank B-102 in Main Tank Farm Diked Area #10	Yes
31	Sump in Main Tank Farm Diked Area #11	Yes
32	Sump in Main Tank Farm Diked Area #12	No
33	Tank N-204 in Main Tank Farm Diked Area #13	Yes
34	Tank N-201 in Main Tank Farm Diked Area #14	Yes
35	Tank N-205 in Main Tank Farm Diked Area #15	Yes
36	Tank N-206 in Production Area #4	Yes
37	Sump in Main Tank Farm Diked Area #16	Yes
38	Sump in Main Tank Farm Diked Area #17	No
39	Tank M-105 in Main Tank Farm Diked Area #17	No
40	Sump in Main Tank Farm Diked Area #18	No
41	Sump in Main Tank Farm Diked Area #19	No
42	Sump in Second Tank Farm Diked Area #1	Yes
43	Wastewater Tank 014 in Second Tank Farm Diked Area #3	Yes

Solid Waste Management Units at Cedar Chemical Corporation.

SWMU #	Name	Active
44	Hazardous Waste Storage Area	Yes (In process of closure)
45	Nonhazardous Waste Storage Area	Yes
46	Drum Storage Area	Yes
47	Drum Crushing Area	Yes
48	Waste Drum Staging Area	Yes
49	Scrap Drum Storage Wagons	Yes
50	Waste Drum Staging Area in Main Tank Farm Area	Yes
51	Waste Oil Drum	Yes
52	Drums	Yes
53	Solvent Cleaner Tank	Yes
54	Miscellaneous Drum Storage	Yes
55	Dumpsters	Yes
56	Laboratory Waste Rack Area	Yes
57	Warehouse Drum Storage Area	Yes
58	Loading/Unloading Dock Area	Yes
59	Stormwater Drainage System	Yes
60	Stormwater Sump	Yes
61	Wastewater Tank #1 Wastewater Treatment System	Yes
62	API Separator	Yes
63	Wastewater Tank #2 Wastewater Treatment System	Yes
64	Flow Equalization Basin	Yes

Solid Waste Management Units at Cedar Chemical Corporation.

SWMU #	Name	Active
65	Aeration Basin	Yes
66	Clarifier #1	Yes
67	Clarifier #2	Yes
68	Polish Pond	Yes
69	Inactive Pond #1	No
70	Inactive Pond #2	No
71	Inactive Pond #3	No
72	Drum Vault	No
73	Buried Drums	No
74	Loading/Unloading Area (Railroad Spur)	Yes

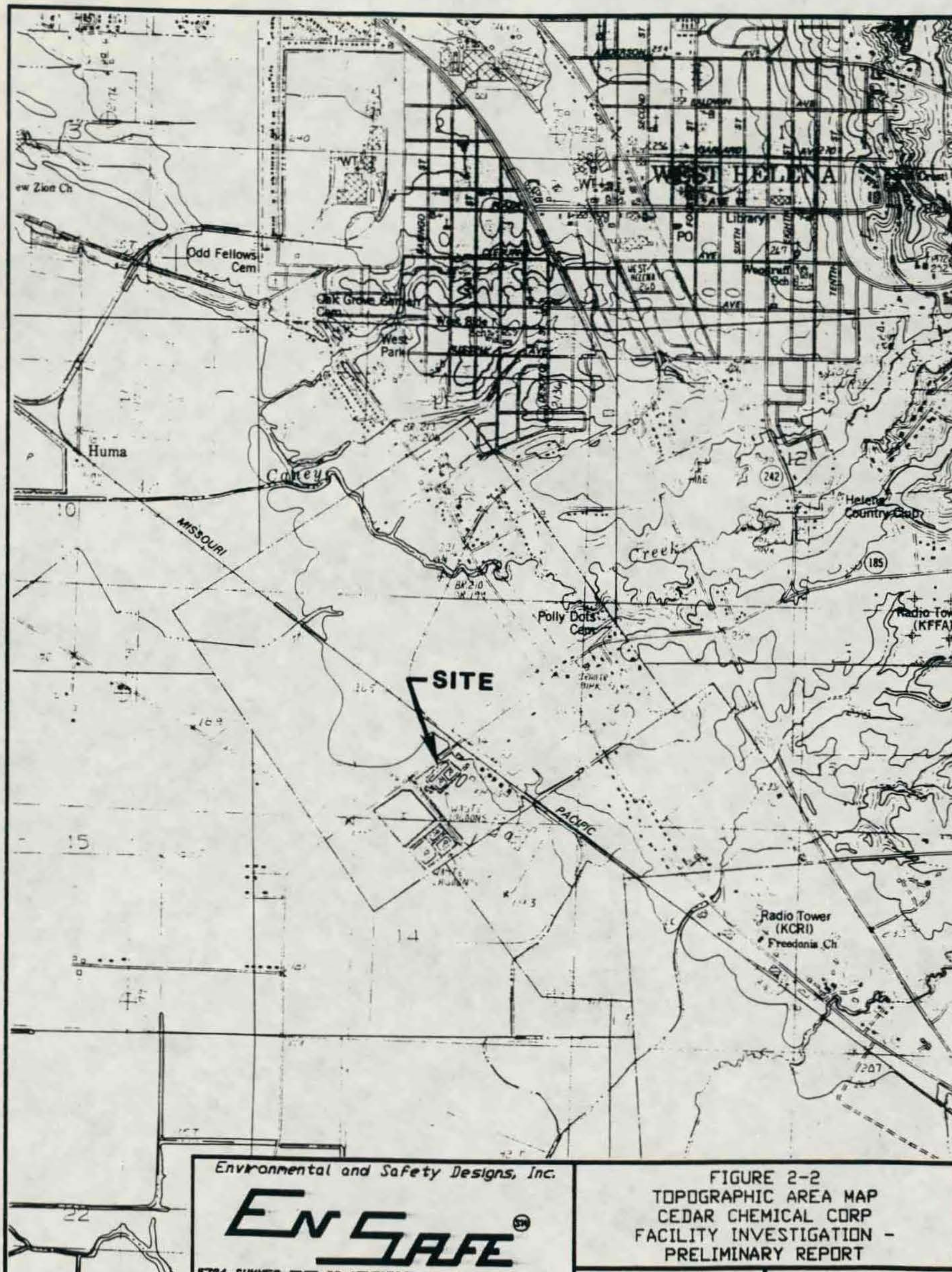

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FIGURE 2-2
TOPOGRAPHIC AREA MAP
CEDAR CHEMICAL CORP
FACILITY INVESTIGATION -
PRELIMINARY REPORT

DATE: 09/09/91

DWG NAME: CEDAR22

currently used as agricultural property. Residential areas are located to the southwest and northeast of the site. There are no known domestic wells within one mile of the site, but an agricultural irrigation well is located approximately a quarter mile north of the site. Information on nearby wells will be confirmed during the Facility Investigation by contacting and interviewing landowners within a one-mile radius to determine if any wells are present, being used, have potential for use, or are planned to be installed for any purpose. Maps of the surrounding land usage and the location of surrounding wells are included in Figures 2-3 and 2-4.

The Cedar Chemical plant receives water from two potable water supplies. The front portion of the plant, which includes the front offices, shower room and laboratory, receives potable water from the City of West Helena. The remainder of the plant is supplied by the City of Helena.

Much of the non-hazardous process and sanitary wastewater discharges to a three-pond biologic treatment system located on the west side of the plant facility. Effluent from the treatment system is pumped off-site through a 4.5 mile pipeline which discharges directly into the Mississippi River through National Pollutant Discharge Elimination System (NPDES) permitted outfall #002. Stormwater runoff is collected in a series of ditches which drain to the southwest corner of the site into a 150,000 gallon stormwater retention pond. The initial 150,000 gallons of stormwater from a rainfall event, are collected in the retention pond. The initial amount of water collected in the pond should contain the highest concentration of contaminants that may be present on the site. Runoff exceeding the capacity of the pond is discharged directly into a stormwater ditch identified as NPDES Outfall #001. The retention pond is subsequently drained by pumping the contents to the biological treatment system adjacent to the west side of the main plant property. The current NPDES Permit # AR0036412 expires in October 1995. No other hazardous material or hazardous waste is treated or disposed at the site. The location of the biological treatment ponds is included in the site map in Figure 2-1.

There have never been any underground storage tanks located on the Cedar Chemical Company property. To the knowledge of plant personnel, there have never been any major spills (the activities during the 1970s which created the yellowed-stained surface contamination appear to have been acts of deliberate dumping of waste pesticides).

2.2 Site History

Prior to 1970, the site was utilized as cultivated farmland. In 1970, Helena Chemical Company acquired the site for construction of a propanil manufacturing facility. In 1971, the plant was sold to J. A. Williams, who in turn transferred the plant to Eagle River Chemical Corporation, a newly formed Arkansas corporation which was initially controlled by the Ansul Company. Under Ansul's management, the plant was converted to the production of dinitrobutylphenol,

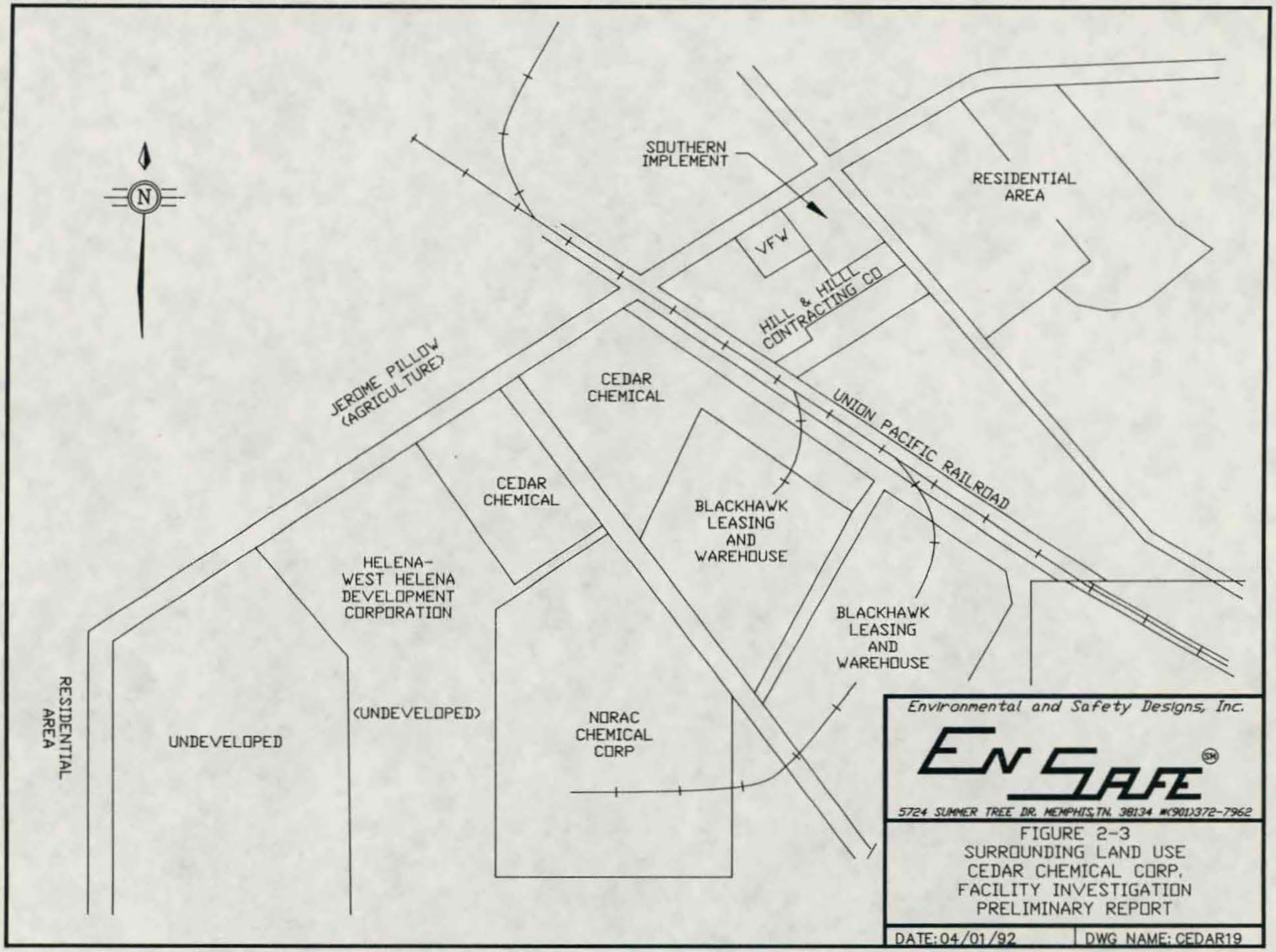

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FIGURE 2-3
SURROUNDING LAND USE
CEDAR CHEMICAL CORP.
FACILITY INVESTIGATION
PRELIMINARY REPORT

DATE: 04/01/92 | DWG NAME: CEDAR19

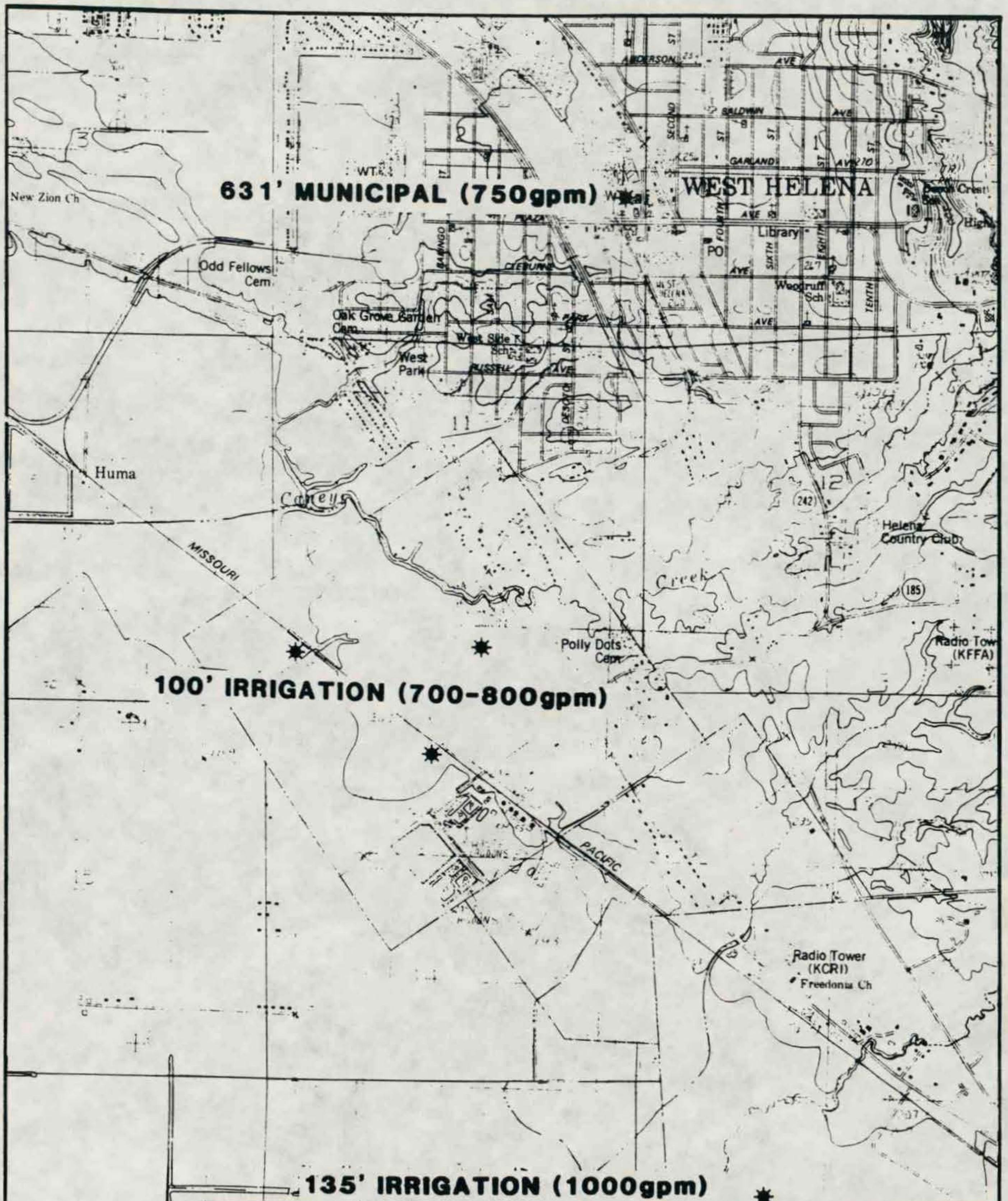

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FIGURE 2-4
SURROUNDING WATER USE
CEDAR CHEMICAL CORP.
FACILITY INVESTIGATION
PRELIMINARY REPORT

DATE: 09/09/91 | DWG NAME: CEDAR21

Table 2.1
Process Descriptions

PROCESS	UNITS	PROCESS STREAMS: FEED	PROCESS STREAMS: PRODUCT	WASTE STREAMS: AIR	WASTE STREAMS: LIQUID	WASTE STREAMS: SOLID
Permethrin, Technical Permethrin Acid Chloride	1	Permethrin Acid, Methyl Ester (PAM) NaOH Methyl Alcohol HCl NaCl Toluene Catalyst Thionyl Chloride Phenoxy Benzyl Alcohol (PBA) Water	Permethrin Acid Chloride Permethrin, Technical	Sulfur Dioxide Hydrochloric Acid Toluene Fugitives: Methyl alcohol Toluene	Sodium Chloride Sodium Sulfate Methanol Toluene Miscellaneous Organics Aqueous Hydrolysis Waste Brine Washes Unrecovered Solvent Spent Scrubber Liquor THESE WASTES ARE CLASSIFIED AS HAZARDOUS, AND ARE DISPOSED BY OFFSITE DEEP-WELL INJECTION.	ok
Cypermethrin, Technical	1	Permethrin Acid, Methyl Ester (PAM) NaOH Methyl Alcohol HCl NaCl Toluene Catalyst Thionyl Chloride Sodium Cyanide Phenoxy Benzaldehyde (PBAld) Sodium Hypochlorite (Bleach)	Cypermethrin, Technical	Sulfur Dioxide HCl Toluene Cyanide Tenneco Solvent Fugitives: Methyl Alcohol Toluene Tenneco 500/100 Solvent	Sodium Chloride Sodium Sulfate Sodium Cyanate Sodium Hypochlorite Cyanide Miscellaneous Organics Water Aqueous Hydrolysis Waste Brine Washes Unrecovered Solvent Spent Scrubber Liquor THESE WASTES ARE CLASSIFIED AS HAZARDOUS, AND ARE DISPOSED BY OFFSITE DEEP-WELL INJECTION.	ok
3,4-Dichloro-propionanilide (Propanil)	2	3,4-Dichloro-aniline (DCA) Propionic Acid Propionic Anhydride Emulsifier Isophorone	Propanil, Technical Propanil-3 (3 lb/gal formulation) Propanil-4 (4 lb/gal formulation) Propanil 55% Blend Stam M-4	Volatile Organic Compounds which	Aqueous Waste (Less Than 3% Propionic Acid) TREATED WITHIN ONSITE BIOLOGICAL TREATMENT SYSTEM.	

Table 2.1
Process Descriptions

PROCESS	UNITS	PROCESS STREAMS		WASTE STREAMS		
		FEED	PRODUCT	AIR	LIQUID	SOLID
Methylthio- pinacolone Oxime (MTPO)	1	Monochloropin- acolone (MCP) NaOH Methyl Mercaptan Hydroxylamine Sulfate Methyl Alcohol Sodium Hypochlorite	MTPO	Methyl Mercaptan Fugitives: Methyl Mercaptan Methyl Alcohol	Aqueous Process Waste Scrubber Liquor Sodium Hypochlorite TREATED WITHIN ONSITE BIOLOGICAL TREATMENT SYSTEM.	? D
ORFOM D-8 (petrosulfur mixture)	4	NaOH Thioglycolic Acid (TGA) Carbon Disulfide	Disodium Carboxy Methyl Trithiocar- bonate	Fugitives: Thioglycolic Acid Carbon Disulfide	Spent Sodium Hypochlorite Scrubber Liquor TREATED WITHIN ONSITE BIOLOGICAL TREATMENT SYSTEM.	? o
ORFOM CO300 (allyl n-butyl trithio- carbonate	4	Sodium Hydroxidide n-Butyl Mercaptan Carbon Disulfide Allyl Chloride	Allyl n-Butyl Trithio- carbonate	Carbon Disulfide n-Butyl Mercaptan Allyl Chloride Fugitives: Carbon Disulfide n-Butyl Mercaptan Allyl Chloride	Water Sodium Chloride Sulfur CS_2 Compounds Spent Sodium Hypochlorite Scrubber Liquor TREATED WITHIN ONSITE BIOLOGICAL TREATMENT SYSTEM.	? o
Tris (hydroxymethyl) aminomethate (TA)	5	Nitroparaffin: Nitromethane Formaldehyde Methyl Alcohol Catalyst Solvent ? o	TA TN	Amines Water Formaldehyde Methanol Nitroparaffins Triethylamines Nitroalcohols Aminoalcohols Aminoparaffins Fugitives: 1-nitromethane 1-nitropropane 2-nitropropane methyl alcohol triethylamine	Aqueous Waste Including Spent Sulfuric Acid Scrubber Liquor THIS WASTE IS CLASSIFIED AS NONHAZARDOUSA ND DISPOSED OFFSITE TO PREVENT DAMAGE TO BIOLOGICAL TREATMENT SYSTEM.	spent solvents ? o

Table 2.1
Process Descriptions

PROCESS	UNITS	PROCESS STREAMS		WASTE STREAMS		
		FEED	PRODUCT	AIR	LIQUID	SOLID
2-amino-butanol (2AB)	5	Nitroparaffin: 1-nitropropane Formaldehyde Catalyst Solvent Methyl Alcohol	2AB	Amines Water Formaldehyde Methanol Nitroparaffins Triethylamines Nitroalcohols Aminoalcohols Aminoparaffins Fugitives: 1-nitromethane 1-nitropropane 2-nitropropane methyl alcohol triethylamine	Aqueous Waste Including Spent Sulfuric Acid Scrubber Liquor THIS WASTE IS CLASSIFIED AS NONHAZARDOUSA ND DISPOSED OFFSITE TO PREVENT DAMAGE TO BIOLOGICAL TREATMENT SYSTEM.	Organic Waste THIS WASTE IS CLASSIFIED AS NON-HAZARDOUS AND DISPOSED OFFSITE TO PREVENT DAMAGE TO BIOLOGICAL TREATMENT SYSTEM.
2-amino-2-propanol (AMP)	5	Nitroparaffin: 2-nitropropane Formaldehyde Catalyst Solvent Methyl Alcohol	AMP	Amines Water Formaldehyde Methanol Nitroparaffins Triethylamines Nitroalcohols Aminoalcohols Aminoparaffins Fugitives: 1-nitromethane 1-nitropropane 2-nitropropane methyl alcohol triethylamine	Aqueous Waste Including Spent Sulfuric Acid Scrubber Liquor THIS WASTE IS CLASSIFIED AS NONHAZARDOUSA ND DISPOSED OFFSITE TO PREVENT DAMAGE TO BIOLOGICAL TREATMENT SYSTEM.	Organic Waste THIS WASTE IS CLASSIFIED AS NON-HAZARDOUS AND DISPOSED OFFSITE TO PREVENT DAMAGE TO BIOLOGICAL TREATMENT SYSTEM.
Dichloronitro-benzene (DCNB), 3,4-Dichloro-aniline (DCA)	6	O-DCB Sulfuric acid Hydrogen H_2SO_4 HNO_3	3,4-DCA	Sulfur Dioxide Nitrogen Oxides VOCs	Washes TREATED IN BIOLOGICAL TREATMENT SYSTEM. Distillation products HAZARDOUS WASTE TREATED OFFSITE BY INCINERATION.	Spent Sulfuric Acid RECYCLED OFFSITE BY SUPPLIER
Telene Rim (R) Resin	1	Polybutadiene DCPD ENB Formulation Ingredients	Telene Rim (R) Resin	DCPD Ethane	Water Toluene Spent Kerosene Scrubber Liquor HAZARDOUS WASTE TREATED OFFSITE BY INCINERATION	

Table 2.1
Process Descriptions

PROCESS	UNITS	PROCESS STREAMS		WASTE STREAMS		
		FEED	PRODUCT	AIR	LIQUID	SOLID
Methyl 2-Benzimidazole Carbamate (MBC)	4	MCC OPD HCl what	MBC	CO2 N2 Dimethyl Carbonate Water Vapor Ammonia HCl	Mother Liquor: Water NaCl Ammonium Chloride Cyana-carbonate Organics Spent Sodium Hychlorite Scrubber Liquor TREATED IN EITHER ONSITE BIOLOGICAL TREATMENT PLANT OR OFFSITE AS NONHAZARDOUS WASTE, DEPENDING ON CHLORIDE LOADING.	Cyanide salt?
Methyl Ethyl Sulfide (MES)	1, 4	Ethyl Chloride Methyl Mercaptan Water NaOH HCl	Methyl Ethyl Sulfide		Aqueous Waste Sodium Hypochlorite Scrubber Liquor TREATED IN ONSITE BIOLOGICAL TREATMENT SYSTEM.	
Metam Sodium	Enclosed Tank Within Tank Farm	Carbon Disulfide Miscellaneous Products	Metam Sodium		Tank Washings SHIPPED OFF-SITE FOR DISPOSAL AS NONHAZARDOUS WASTE	
Isonox 132 (2,6-di-tert-butyl phenol	2, 3	Para-secondary Butylphenol Isobutylene Acid Catalyst Sodium Carbonate Sodium Hydroxide Water	2,6-di-tert-butyl phenol	Hydrogen Isobutylene	Wastewater: Acid Catalyst TREATED IN ONSITE BIOLOGICAL TREATMENT SYSTEM. Distillation Bottoms SHIPPED OFF-SITE FOR DISPOSAL AS NONHAZARDOUS WASTE	
Dinitro-ortho-cresol (DNOC)		Ortho-Cresol Nitric Acid Calcium Oxide Styrene	Dinitro-ortho-cresol	Nitrogen Oxides Carbon Dioxide Water Vapor	Aqueous Wastewater: Neutralized Acid SHIPPED OFF-SITE FOR DISPOSAL AS NONHAZARDOUS WASTE	

Table 2.1
Process Descriptions

PROCESS	UNITS	PROCESS STREAMS		WASTE STREAMS		
		FEED	PRODUCT	AIR	LIQUID	SOLID
2-Chloro-4-Nitrotoluene	4	Para-nitrotoluene Chlorine Water Soda Ash Ferric Chloride Catalyst	P-Nitrotoluene 2-Chloro-4-Nitrotoluene Dichloronitro-toluene	Hydrochloric Acid Chlorine	Wastewater: Ferric Chloride Hydrogen Chloride Water Soda Ash Phenolic Compounds Spent Sodium Hypochlorite Scrubber Liquor THESE WASTES ARE CLASSIFIED NONHAZARDOUS AND DISPOSED OFFSITE TO PREVENT DAMAGE TO BIOLOGICAL TREATMENT SYSTEM.	
(1-(carboethyoxy) ethyl-3-[2-(trifluoromethyl) phenoxy] benzoate) (CTBL, COBRA)	1	3-(2-Chloro-4-(trifluoromethyl) phenoxy) benzoic acid Dimethyl sulfoxide (DMSO) Potassium Carbonate Ethyl 2-chloro-propionate (ECP) Methylene Chloride Hydrochloric Acid Sodium Hydroxide Sodium Hypochlorite	(1-(carboethyoxy) ethyl-3-[2-(trifluoromethyl) phenoxy] benzoate) (CTBL)	? 0	DMSO Waste - CTBL (1-3%) - Ethyl-2-chloropropionate (1-2%) - Ethylacetoxy-propionate (0-1%) Aqueous Brine - Water (80-90%) - Potassium Chloride (5-10%) - Sodium Chloride (5-10%) - DMSO (0-0.5%) - Methylene Chloride (180 ppm) THESE WASTES ARE CLASSIFIED NONHAZARDOUS AND DISPOSED OFFSITE TO PREVENT DAMAGE TO BIOLOGICAL TREATMENT SYSTEM.	? 0

Table 2.1
Process Descriptions

PROCESS	UNITS	PROCESS STREAMS		WASTE STREAMS		
		FEED	PRODUCT	AIR	LIQUID	SOLID
Diethylhexyl Phosphoric Acid	4	2-Ethylhexyl-alcohol Phosphorus Trichloride Chlorine Sodium Hydroxide	Diethylhexyl phosphoric acid		Acidic Aqueous Waste (Neutralized) Spent Scrubber Liquor Organic Waste THESE WASTES ARE CLASSIFIED NONHAZARDOUS AND DISPOSED OFFSITE TO PREVENT DAMAGE TO BIOLOGICAL TREATMENT SYSTEM.	

also known as dinoseb. In late 1972, Ansul sold its majority stock interest in Eagle River Chemical Corporation back to the corporation, leaving J. A. Williams as the sole shareholder. Eagle River Chemical Corporation was subsequently merged into Vertac Chemical Corporation. Cedar Chemical Corporation acquired the site from Vertac in 1986.

Solid wastes generated during the period prior to operation by Vertac are largely unknown. Table 2.1 provides a description of the processes which are either presently being utilized or have been utilized at this facility in the past. The table also provides a description of waste products from the various processes. It should be noted that formulation processes vary because of the contract nature of the business. However, the manufacturing segment is routinized and not subject to substantial variation.

2.2.1 Site Operations

Cedar Chemical Corporation manufactures various agricultural chemicals and organics including insecticides, herbicides, polymers, and organic intermediates. Plant processes are batch operations with seasonal production fluctuations and constant introduction of new products. Batch chemical process operations include acylation, alkylation, amidations, carbamoylation, chlorination, distillation, esterification, acid and base hydrolysis, and polymerization. Cedar Chemical Corporation manufactures its own products (such as Propanil, a rice herbicide) and also serves as a custom manufacturer of chemicals for contract customers. Formulation and packaging are ancillary activities, should the product be ready for the consumer market.

The facility employs approximately 125 people. The plant operates 24 hours per day, seven days per week. The facility consists of 5 production units.

Unit 1 is utilized for formulation of various custom products for other companies. Unit 2 is the propanil production unit. Unit 3 was destroyed in a fire and explosion on September 26, 1989. Unit 4 is used for production of various custom products. Unit 5 is primarily used to manufacture nitroparaffin derivatives. Unit 6 began producing dichloroaniline in 1991 which is used in the production of Propanil.

2.2.2 Solid and Hazardous Waste

Cedar Chemical is a large quantity generator of hazardous wastes. The majority of wastes classified as hazardous are due to knowledge of process; therefore, no analytical data is available. Appendix A contains the only analytical report concerning present wastes which are generated; these analyses were performed on the COBRA wastestream (See Table 2.1).

The majority of hazardous waste generated are transported offsite for disposal. Some basic treatment processes do occur onsite regarding characteristic wastes. Waste propionic acid and waste sodium hypochlorite scrubber liquor are treated in totally enclosed treatment vessels within process units at the site and are exempt from hazardous waste permitting. Waste propionic acid undergoes elementary neutralization through the addition of anhydrous ammonia. Waste sodium hypochlorite is treated with sodium sulfite to remove excess hypochlorite. After treatment, these materials, which no longer exhibit the corrosivity characteristic, are discharged to the biological treatment plant.

The remainder of hazardous wastes generated are shipped off-site for disposal. Cedar Chemical does not currently conduct onsite storage or disposal activities for the hazardous wastes generated at the facility. With the exception of the wastes described in the previous paragraph, hazardous wastes generated at the facility are stored onsite less than ninety (90) days and transported off site for disposal at an approved landfill, incineration or deep-well injection facility. Any airborne contaminants which are emitted from the plant in its current mode of operation are provided for under Permit 878-AR-5 issued on November 12, 1991 by the ADPC&E. An application for one air permit modification is presently pending with ADPC&E.

The plant filed a Part A hazardous waste management facility permit application with the Arkansas Department of Pollution Control and Ecology in November, 1980. Interim status was granted for a hazardous waste storage tank, a hazardous waste container storage area, and a hazardous waste treatment unit (the biological treatment system). A Part B application was filed on August 15, 1984. The Part B application was accepted through the NOD process as technically complete. However, the two storage units were closed in accordance with RCRA regulations in 1988. No post-closure care is required. A thorough review by ADPCE concluded that hazardous waste was not being treated at the biological treatment system. Therefore, ADPCE never processed the Part B application.

Certain non-hazardous waste streams, which are evaluated on a case-by-case basis, are sent to off-site disposal facilities because of their incompatibility with the biological treatment system. An example of this is a wastestream with a high salt concentration.

Table 2-2 lists the hazardous wastes generated at the facility within the past three years, and the hazardous waste transporters and disposal facilities which have been used by Cedar Chemical regarding these wastes. Table 2-2 also lists several transporters/disposal facilities which were used prior to 1989; however, no records regarding hazardous waste codes and quantities are available.

Onsite waste disposal methods were used at the facility prior to the acquisition of the property by Cedar Chemical. It is known that, during certain periods between 1971 and 1973, the former owners of the facility began disposing of waters in three unlined earthen ponds. Thereafter, Helena Chemical Company (at the time an affiliate of the site owner) used the ponds for disposal of waste water generated in its formulating and packaging operations at a nearby facility.

The three ponds are believed to have received propionic acid wastes, a calcium chloride brine stream from an insecticide process, and a sulfuric acid waste. The small pond was used for the neutralization of dichloroaniline, sulfuric acid, and propionic acid through the addition of limestone. The other two ponds were used for waste disposal. Wash waters from Helena Chemical's chemical formulation operations were also placed into the ponds. Helena Chemical formulated some 100 to 200 compounds, and has no knowledge of what types of wastes were produced. Helena Chemical stopped disposing of their wastes in the ponds in early 1976. The ponds were closed in 1978. The closure procedure consisted of pumping the water from the ponds and then placing a clay cap of native soils and bentonite over them. The water was removed and disposed of by Rollins Environmental Services.

Table 2-2
HAZARDOUS WASTE TREATMENT, STORAGE AND DISPOSAL FACILITIES

FACILITY	TSD	HAZARDOUS WASTE CODE	QUANTITY	GENERATING PROCESS
C.M. Penn and Sons EPA I.D. # LAD034190215	Transporter	P020	3,780,000 lbs	Soil Removal
Chemical Waste Management Carlyss, Louisiana EPA I.D. # LAD000777201	Landfill	P020	3,780,000 lbs	Soil Removal
Ross Transportation EPA I.D.# OHD980614374	Transporter	F005 D001	39,640 lbs	Production Waste
Ross Incineration Grafton, Ohio EPA I.D.# OHD048415665	Incineration	F005 D001	39,640 lbs	Production Process
Miller Transport EPA I.D.# MSD003851409	Transporter	D001	587,680	DEHPA Process
ENSCO, Inc. El Dorado, Arkansas EPA I.D.# ARD069748192	Incineration	D001	587,680 lbs	DEHPA Process
		D001	139,625 lbs	Propanil Process
		D023 D001	47,998 lbs	Permethrin/Cypermethrin Process
Lee's Trucking EPA I.D.#981513385	Transporter	D001	139,625 lbs	Propanil Process

Table 2-2
HAZARDOUS WASTE TREATMENT, STORAGE AND DISPOSAL FACILITIES

FACILITY	TSD	HAZARDOUS WASTE CODE	QUANTITY	GENERATING PROCESS
		D023 D001	47,998 lbs	Permethrin/Cypermethrin Process
		D001	626,100 lbs	Production Processes
		D007	159,880 lbs	Process Changeover to Non-Chromium-Containing Material
Chemical Waste Transport EPA I.D.# ARD983272675	Transporter	D001	6,490,140 lbs	Cypermethrin Process
EMPAK, Inc. Deer Park, Texas EPA I.D.# TXD097673149	Incineration	D001	6,490,140 lbs	Cypermethrin Process
		D001	10,852,400 lbs	Production Processes
		D001	17,121,000 lbs	Production Processes
Union Pacific Railroad EPA I.D.# MOD006968101	Transporter	D001	10,852,400 lbs	Production Processes
		D001	17,121,000 lbs	Production Processes
Environmental Transportation Service EPA I.D.# OKD981605363	Transporter	D001	89,100 lbs	Production Processes
Gibralter Chemical Resources Winona, Texas EPA I.D.# TXD000742304	Deep Well Disposal	D001	89,100 lbs	Production Processes
		D001	663,420 lbs	Production Processes
		D001	626,100 lbs	Production Processes
Gibralter Wastewaters, Inc. Kilgore, Texas EPA I.D.# TXD000742304	Transporter	D001	663,420 lbs	Production Processes

Which

Table 2-2
HAZARDOUS WASTE TREATMENT, STORAGE AND DISPOSAL FACILITIES

FACILITY	TSD	HAZARDOUS WASTE CODE	QUANTITY	GENERATING PROCESS
Rollins Environmental Services of Louisiana, Inc. Plaquemine, Louisiana EPA I.D.# LAD000778514	Deep Well Disposal	D007	159,880 lbs	Process Changeover to Non-Chromium-Containing Material
ADDITIONAL TSD FACILITIES USED IN THE PAST				
Chemical Resources, Inc. Tulsa, Oklahoma	Disposal			
CECOS Environmental Odessa, Texas	Disposal			
Service Lines, Inc. Marshall, Texas	Transporter			

Prior to Cedar Chemical's purchase of the property, as many as 300 drums of waste were placed in a concrete vault beneath the onsite warehouse. The current condition and contents of these drums is unknown. While constructing a drainage ditch, an undetermined number of buried drums were discovered in the vicinity of the newest production unit (Unit 6). Under the terms of the current Consent Administrative Order, Cedar Chemical Corporation has removed these buried drums in accordance with the approved removal work plan dated June 1990.

Since the current CAO was issued, Cedar Chemical Corporation officials obtained information from individuals who worked at the plant prior to Cedar's purchase of the facility concerning two additional drum burial sites. A geophysical survey was conducted at the site and subsurface anomalies were identified in the areas where drums were suspected to have been buried. Immediate removal actions have been conducted at the site to remove the additional buried drums. The location of these additional burial areas can be found in the topographic site plan in Figure 2-1.

2.3 Environmental Setting

2.3.1 Physiography

The Cedar Chemical Company facility is located approximately two miles west of the Mississippi River in part of a physiographic setting known as the Mississippi Embayment Region. The topography of the terrain at the site and surrounding area is relatively flat with some areas dipping gently towards the southeast. Ground surface elevations at the site tend to vary from about 188 to 197 feet mean sea level (MSL). Localized changes in topographic relief are due mainly to alterations made to the original ground surface for construction purposes or for directing surface flow runoff. Generally, surface flow runoff tends to be towards the southeast and the Mississippi River. Since topography is relatively flat, overland flow velocities are low and some areas where no modifications have been made to the original ground surface are poorly drained. The facility is not located in the 100 year floodplain of the Mississippi River.

2.3.2 Regional Geology

The lowermost geologic unit of concern at the site is the Sparta Sand. The Sparta Sand consists mainly of a gray, very fine to medium sand with brown and gray sandy clay. This formation appears to have been a beach deposit of a transgressing sea and ranges in thickness from 300 to 400 feet. The Sparta Sand serves as the major deep source of groundwater in the area.

Overlying the Sparta Sand is the undifferentiated Jackson-Claiborne Group. The Claiborne Group consists mainly of silty clay with some thin, discontinuous beds of silty clay and lignite. The Jackson Group is typically comprised of gray, brown, and green silty clay with some lignite.

The surficial and near surficial soils consist of alluvial deposits of fine grained sands and silt of Quartenary age. These deposits generally range from 25 to 40 feet in thickness and are often underlain by coarser sands and gravel. Portions of these upper soils apparently consist of outwash from Crowley's Ridge as evidenced by the relatively high silt content.

A chart of the regional geologic formations for this area found in the *Geological Highway Map of the Mid-Continent Region* published by The American Association of Petroleum Geologists is included as Figure 2-5.

2.3.3 Site Geology

During a previous investigation conducted at the site, three distinct stratigraphic units were identified beneath the site. The basal stratigraphic unit identified consisted of a very stiff, dark gray, sandy clay with lignite. This stratum was encountered a depth of approximately 134 feet below ground surface. Geological and hydrogeological information and data obtained from previous investigations can be found in Appendix B.

Overlying the sandy clay is a relatively clean fine to coarse sand with some gravel to a depth of approximately 50 feet. This sand grades in a fining upward sequence to a medium dense to dense silty fine sand to depths of 42 to 27 feet.

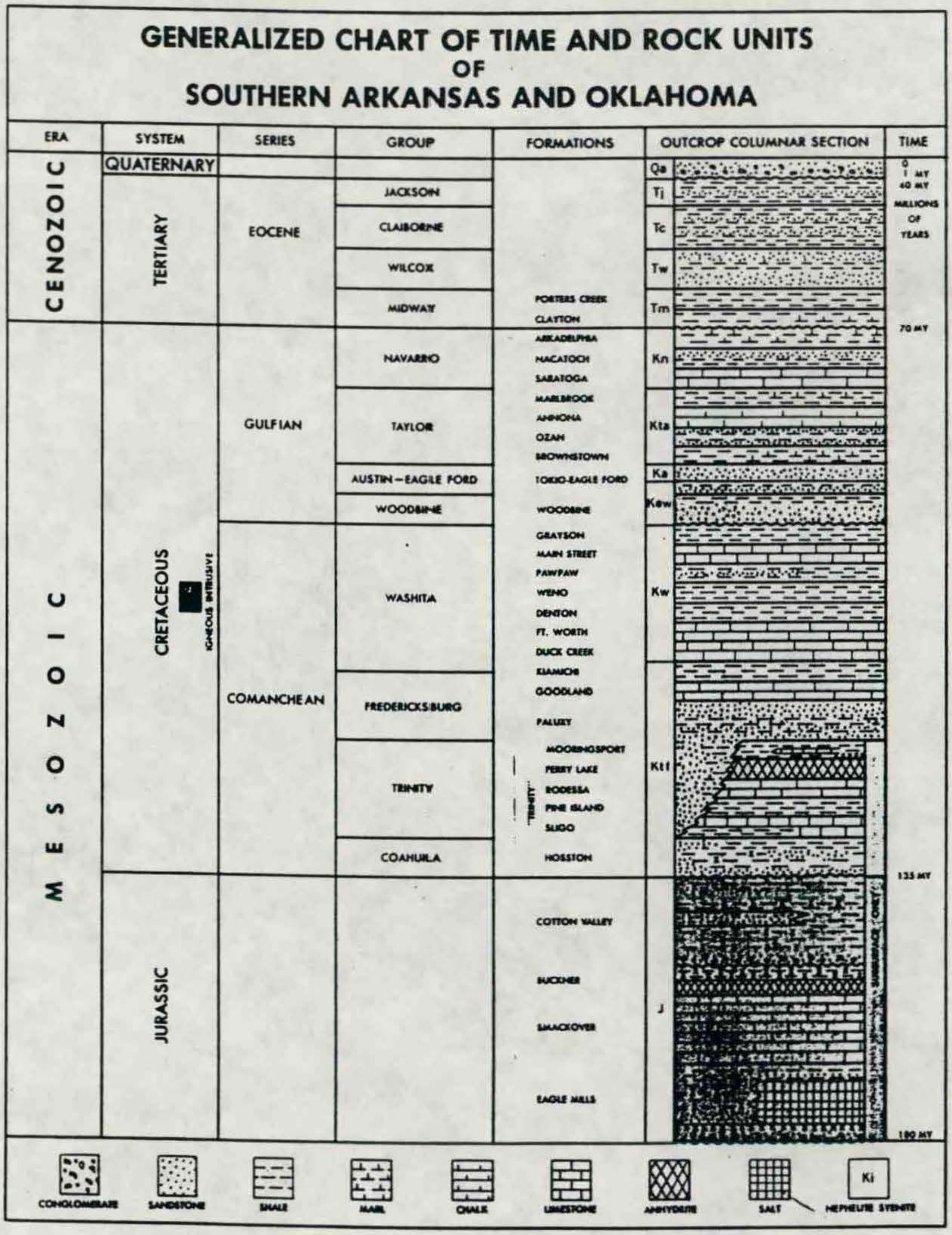

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FIGURE 2-5
REGIONAL GEOLOGIC FORMATIONS
CEDAR CHEMICAL CORPORATION
FACILITY INVESTIGATION
PRELIMINARY REPORT

DATE: 04/09/92

DWG NAME: CEDAR25

Interbedded very stiff to firm, tan, gray and brown silty clay and clayey silts were encountered from the ground surface to the top of the alluvial sands. Coefficients of permeability of this unit were found to range from 4.0×10^{-5} cm/sec to 8.5×10^{-8} cm/sec.

2.3.4 Site Hydrogeology

The site is underlain by several units of unconsolidated Quaternary and Tertiary sedimentary deposits. Units with high sand content form aquifers and silty, clayey units serve as aquitards.

The uppermost aquifer at the site is comprised of fine to medium grained alluvial sand deposits. This alluvial aquifer is bounded by silty clays and clayey silts above, and the Jackson Clay below. Table 2-3 summarizes data from a previous hydrogeologic study that describes some characteristics of these units. (Grubbs, Garner, & Hoskyn, Inc., 1988)

Because there are three (3) large irrigation wells (700-1000 gpm each) within one (1) mile of the site to the north, natural groundwater flow is inconclusive. Weekly static water level data collected between July 1988 and March 1988 reveal a groundwater divide trending northeast/southwest across the center of the site. This divide was present in 15 of 21 water level measurement events. In general, groundwater north of the divide flows to the northwest and groundwater flow south of the divide is oriented to the south.

The weekly water level measurements also indicate that the hydraulic gradient for the alluvial aquifer ranges between 0.0006 and 0.002 feet per foot. Using these figures, the range of hydraulic conductivities in Table 2-3, and an effective porosity of 50% (estimated in the PR/VSI report by A.T. Kearney, Inc., 1988), a range of groundwater velocities have been calculated:

$$Q = \frac{k * i}{n}$$

Where:

k = hydraulic conductivity (feet/day)
i = hydraulic gradient (feet/foot)
n = effective porosity (percent)
Q = groundwater velocity

Low Estimate

$$\frac{0.000036 * 0.0006 * \dfrac{86400\ \text{sec}}{30.48\ cm}}{0.5} = 1.2\ x\ 10^{-4}\ ft/day$$

High Estimate

$$\frac{0.002 * 0.0025 * \dfrac{86400\ \text{sec}}{30.48\ cm}}{0.5} = 0.28\ ft/day$$

Table 2-3
HYDROGEOLOGIC STUDY
(GRUBBS, GARNER, & HOSKYN - JULY 1988)

Unit	Depth from Ground Surface	Falling Head Permeability cm/sec	K Hydraulic Conductivity cm/sec	Hydraulic Properties
Stiff Gray to Brown Silty Clay and Clayey Silt	0-35' (avg.)	8.5×10^{-8} to 4×10^{-6}	N/A	Aquitard and possible upper confining unit for the alluvial aquifer
Medium to Fine silty Sand	35 to 140'	N/A	Upper Portion 3.6×10^{-6} to 7.1×10^{-4} Lower Portion 2.5×10^{-2}	Alluvial aquifer, yields 700-100 gpm to nearby irrigation wells
Stiff Gray Sandy Clay	Below 140'	1×10^{-7} (est.)	N/A	Aquitard, Probably the lower confining unit for the alluvial aquifer

N/A - Not Available

2.3.5 Meteorology and Air Quality

Arkansas has the humid mesothermal climate characteristics of the southeast to south-central United States. The area rainfall is 50 inches per year, with most precipitation occurring between February and April. Phillips County is an attainment area for all primary and secondary air pollutants. The prevailing wind is southwest at an average speed of 8 mph and is in that direction 12.3 percent of the time. The average annual temperature is 62.7 degrees Fahrenheit.

2.4 Summary of Past Environmental Permits

The following permits have been issued to Cedar Chemical Corporation or previous owners/operators of the facility:

- Permit 126-A was issued to Eagle River Chemical Corporation in 7/28/72 to manufacture Propanil from propionic acid, propionic anhydride, and 3,4-dichloroaniline.

- Permit 126-AR-1 was assigned to Eagle River Chemical Corporation on 11/19/76 to include the addition of three new processes: a) nitro benzoate ester, b) methomyl, c) Basalin.

- Permit 126-AR-2 was issued to Eagle River Chemical Corporation on 9/29/78 to replace the Steam Jet Vacuum device with a vacuum pump.

- Permit 126-AR-3 was assigned to Vertac, Incorporated on 11/16/79 to include manufacturing permethrin and cypermethrin.

- Permit 126-AR-4 was issued to Vertac Chemical Corporation on 7/24/81 to include expansion of DRA unit.

- Permit 878-A was assigned to Cedar Chemical Corporation on 4/4/88 to update the facility's existing air permits.

- Permit 878-AR-2 was issued to Cedar Chemical Corporation on 12/12/89 to include production of tris (hydroxymethyl) aminomethane (TA), 2-amino-butanol (2ab), and 2-amino-2-propanol (AMP).

- Permit 878-AR-3 was assigned to Cedar Chemical Corporation on 7/10/90 to include manufacturing of Telene Rim (R) Resin.

- Permit 878-AR-4 was assigned to Cedar Chemical on September 17, 1991 and includes permethrin acid chloride, DEPHA, Sectagon, methylthiopinocolone oxime (MTPO), Orfom D-8 and C0300, dichloronitrobenzene (DCNB), 3,4-dichloroaniline (DCA), methyl 2-benzimidazole carbamate (MBC) in addition to the previously approved substances.

- Permit 878-AR-5 was assigned to Cedar Chemical Corporation on 11/12/91 to include manufacturing of CTBL (COBRA). Note: An application for one permit modification is pending.

- Permit AR0036412 was assigned to Cedar Chemical on 9/27/85 to allow the discharge of treated effluent water to the Mississippi River and the industrial drainage ditch. This permit expired on 9/27/90. It was renewed on 9/28/90 to expire on 10/31/95.

2.5 Summary of Enforcement Actions

On December 19, 1986, a notice of violation was issued by the ADPC&E citing *reasonable grounds to believe that Cedar Chemical Corporation and Vertac Chemical Corporation have committed the following violations of Arkansas Waste Management Act of 1979, the Arkansas Hazardous Waste Management Code, the Arkansas Water and Air Pollution Control Act and Regulation No. 2.*

These alleged violations included:

- Disposal of hazardous wastes at a facility without a permit (release of characteristic hazardous waste consisting of wastewater with pH values of less than or equal to 2 or greater than or equal to 12.5 to the biological treatment ponds) on the following dates in 1986: January 3, February 20, February 28, March 3, March 6, March 10, March 11, April 2, April 7, April 8, April 14, and April 18.

- Failure to maintain and operate the facility in a manner that would minimize the possibility of any sudden or non-sudden releases of hazardous wastes or hazardous waste constituents to the soil or surface waters.

- Placing wastes in a location likely to cause pollution of the waters of the State.

- Failure to inspect a container storage area frequently enough to detect potential problems and failure to develop and follow a written inspection schedule.

- Failure to develop and remedy deterioration or malfunction of equipment or structures on a schedule which ensures that the problem does not lead to an environmental or human health hazard (this alleged violation involved an inoperative sump in the container storage area).

Cedar was assessed to investigate these allegations in accordance with APDCE regulations (sampling and analysis of biological treatment ponds, soil and geologic survey, groundwater monitoring plan) and pay assessments totaling $45,000.

These allegations led to a Consent Administrative Order (CAO) which:

- Dismissed Vertac as a party to the Action.
- Called for a stop to the release of any hazardous wastes to surface impoundments at the West Helena Facility.
- Called for the investigations indicated by the Notice of Violation to be initiated.
- Established a report schedule for these investigations (including penalties for late reporting).
- Agreed to a compromise on civil penalties of $15,000.

The current CAO confirms that Cedar Chemical Corporation fully complied with the previous CAO.

On June 26, 1990, Cedar Chemical was informed of a violation which was observed during a compliance evaluation inspection. The violation involved the disposal of monitoring well purge water directly onto surface soils. Groundwater monitoring at the site has been terminated until this issue is resolved.

3.0 NATURE AND EXTENT OF CONTAMINATION

3.1 Release Pathways

This section discusses the potential for release of hazardous constituents into the various media and the potential impact the releases might have on human health. Potential migration pathways will also be discussed for each individual Solid Waste Management Unit (SWMU) involved in this facility investigation.

3.1.1 Air Release Pathways

Many of the hazardous materials manufactured and used at the facility contain volatile organic compounds. However, the manufacturing processes at the plant utilize effective pollution abatement techniques to minimize air emissions. Cedar Chemical has also obtained permits for their point source emissions from ADPC&E. The primary source of hazardous air pollutants at the facility are fugitive emissions from isolated activities in which small quantities of volatile organic compounds generated or used at the facility are exposed to the air. Incidental surface releases could also result in hazardous air emissions. Fugitive air emissions from non-permitted sources do not pose a significant threat to air quality at the Cedar Chemical facility.

3.1.2 Surface Water

Stormwater runoff is collected in an open stormwater drainage system (SWMU #59) and discharged into the 150,000 gallon stormwater retention pond (SWMU #60). The retention pond is subsequently drained by pumping the contents to the biological treatment system. Treated wastewater effluent is pumped through a 4.5 mile pipeline to the Mississippi River where it is released as NPDES permitted outfall #002. In the event of excessive rainfall, the stormwater sump is bypassed and surface runoff is discharged via NPDES permitted outfall #001 to the industrial park ditch adjacent to the facility.

The NPDES permit for the facility requires monitoring outfalls #001 and #002 for various parameters. Monitoring records indicate that the facility has been successful in meeting the effluent limitations specified for outfall #002, with only occasional excursions. The records indicate that the intermittent stormwater discharged through outfall #001 often exceeds its NPDES effluent limitations (primarily for Chemical Oxygen Demand, Oil and Grease and pH). Discharges from outfall #001 have also recently failed biomonitoring testing for toxicity.

Since all surface water runoff on the site is collected in the stormwater drainage system, the only threats to offsite surface waters are from NPDES outfalls #001 and #002. According to available information, outfall #001 on several monitoring events has exceeded the permit limitations. Appendix C contains a copy of the current NPDES permit for the facility, records of past deficiencies, and monitoring data for outfall #001.

Pursuant to the requirements of the 1986 Consent Administrative Order described in Section 2.5, Cedar Chemical contracted with Sorrells Research Associates, Inc. to conduct an investigation of the biological treatment system This study included the sampling and analysis of individual unit sludges and sediments. Appendix D contains the report describing the results of this investigation.

3.1.3 Soil Pathway

Areas of yellow stained soil (Area of Concern #1) were observed at the facility during a 1988 VSI conducted by EPA Region VI. This staining has been attributed to a dinitroherbicide which was manufactured by a former operator of the site and reportedly dumped on the site; however, no analyses have been conducted to positively identify the contaminant. Potential soil contamination was noted at several SWMU's on the site also.

Surface and subsurface soil sampling was conducted at three inactive ponds (SWMU's #69, #70 and #71) in 1985 by Ecology and Environment, Inc. under contract for EPA Region VI. Results of the sampling event indicated that the subsurface material is contaminated with pesticides and other organic compounds and that the surface fill is contaminated with pesticides. A copy of the sampling report issued by Ecology and Environment can be found in Appendix D.

As noted earlier in the report buried drums of unknown material have been discovered on the plant site (SWMU #73). Woodward-Clyde Consultants collected soil samples from areas adjacent to the buried drums where the DCA manufacturing unit was later constructed. The samples were analyzed for various pesticides and organic compounds. The results of the analyses revealed pesticide contamination as deep as 15 feet. A map of the sampling locations and the corresponding laboratory data from the Woodward-Clyde report can also be found in Appendix D. It should be noted that a plan to remove the drums has been approved by the ADPC&E and has been implemented under an agreement established in the current CAO.

Soil samples were collected in 1984 by Ecology and Environment, Inc. as part of the National Dioxin Study. During the sampling event 43 soil samples were collected from different locations and analyzed for TCDD (Dioxin). The study revealed that no TCDD was detected in any of the samples collected at the facility. A memorandum from Tom Smith with Ecology and Environment to Keith Bradley verifies the sampling results. A copy can be found in Appendix D.

A study of the contents of the biological treatment system was conducted by Sorrells Research Associates, Inc.,in 1988 pursuant to the requirements of the 1986 CAO. This study included sampling and analysis of the basin waters, sludges and sediments. No samples were obtained from soils under the basins clay liners; therefore, their impact on subsurface soils is unknown. A copy of the Sorrells report is included in Appendix D.

Due to the potential for soil contamination from several SWMU's and confirmed or observed soil contamination at several locations, soil at the Cedar Chemical plant represents a significant release pathway for site contaminants.

3.1.4 Groundwater Pathway

A hydrogeologic investigation was conducted at the site in 1988 by Grubbs, Garner and Hoskyn, Inc. According to their report, the coefficients of permeability in the upper soil stratum range from 8.5×10^{-8} in the silty clay soils to as high as 4.0×10^{-5} in the clayey silt soils. These low permeability soils would help impede the vertical migration of contaminants on the site, but the potential for groundwater contamination still exists. The soil contamination sources discussed in the previous section would be the most likely sources of groundwater contamination on the site.

Sufficient data has not yet been collected to characterize the groundwater aquifer at the site. Therefore, additional study in aquifer characterization will be included in the Facility Investigation Workplan. The reports developed by Grubbs, Garner and Hoskyn, Inc. include boring logs, monitoring well schematics, soil profiles, groundwater elevations, and potentiometric surface maps for the site. A copy of these reports can be found in Appendix B. Limited chemical analyses on groundwater samples collected from the wells have been conducted. A copy of all available groundwater data can also be found in Appendix E.

3.1.5 Potential Impact on Human Health

Cedar Chemical Corporation has approximately 125 employees at its West Helena plant. Other industrial park properties are adjacent to the western and southern boundaries of the Cedar Chemical property. Beyond the industrial park to the north and west is primarily agricultural land. Residential property located to the southwest and northeast of the site obtain their potable water supply from municipal wells more than one mile away from the site. The majority of the stormwater runoff at the site is collected and treated prior to being discharged into the Mississippi River via a 4.5 mile pipeline. Access to the site is limited to authorized personnel only. The Cedar Chemical facility does not pose a significant threat to human health due to the waste management practices at the facility, the limited access of the property to unauthorized personnel and the distance (approximately one mile) of the nearest drinking water supply well to the site.

3.2 Possible Sources of Contamination

The PR/VSI Report issued by EPA in 1988 identified 74 solid waste management units and one additional area of concern (AOC) at the Cedar Chemical facility (A complete list of the SWMU's can be found in Appendix F and a map showing the location of the SWMU's can be found in Figure 3.1). Thirteen of the SWMU's and the one AOC identified by EPA were considered to have a strong potential for past releases to the environment and will require further investigation to determine if a release has occurred. The following sections describe each of

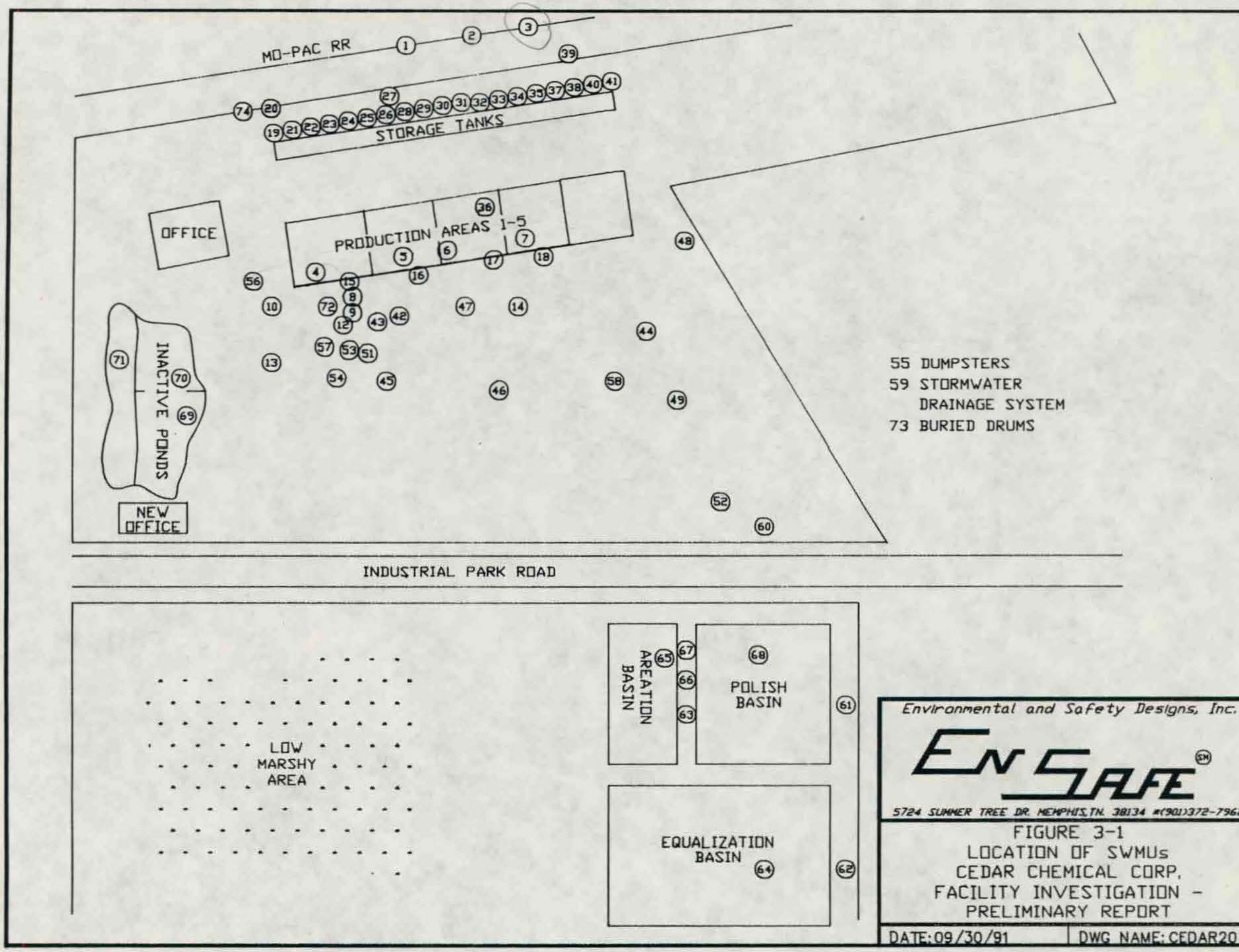

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FIGURE 3-1
LOCATION OF SWMUs
CEDAR CHEMICAL CORP.
FACILITY INVESTIGATION -
PRELIMINARY REPORT

DATE: 09/30/91 | DWG NAME: CEDAR20

these units based upon the observations made during the PR/VSI, including the possible contaminants released from each unit and the most likely release pathway. Table 3.1 lists all 74 SWMU's and their current status.

3.2.1 SWMU #3 - Railroad Loading and Unloading Sump

This unit is a severely deteriorated concrete sump located near the railroad tracks next to the main tank farm. The sump is approximately 2 feet by 3 feet by 2 feet deep and the sides of the unit have deteriorated and fallen into the sump. The unit was built in the 1970s and was taken out of service in the mid 1980s. The sump was used to contain any spillage that may have occurred during loading and unloading material from rail cars. There are no records of past spills from this unit and there no visible signs of a release into the soils adjacent to the unit.

The past potential for releases from this unit to soil, groundwater, and subsurface gas is possible due to the condition of the sump and the nature of the materials used at the site. The past potential for releases from this unit to air and surface water is moderate, and low respectively.

3.2.2 SWMU #59 - Stormwater Drainage System

This unit consists of a series of unlined ditches and corrugated metal pipe which drain the entire facility to the stormwater sump (SWMU #60). The ditches are unlined and vary in width from approximately 3 to 6 feet, and in depth from approximately 2 to 5 feet. One of the ditches is within 10 feet of the yellow stain area (AOC #1). In the event of rain, the first 150,000 gallons is drained to the stormwater sump and eventually into the biological treatment system. The remainder of the stormwater runoff is diverted through a manually operated gate to NPDES permitted outfall #001 that drains offsite to the industrial park drainage ditch. The industrial park ditch drains to Beaver Bayou then into Big Creek and eventually to the White River. During the VSI, an oily film was observed on the water near the control gate.

Releases from this unit to air, soil, groundwater, and subsurface gas is possible because the unit is unlined, and because many of the constituents of the waste managed by this unit are volatile. Releases to adjacent surface water could occur during heavy rains through NPDES-permitted outfall #001.

3.2.3 SWMU #60 - Stormwater Sump

This unit, a component of the wastewater treatment system, is an earthen basin approximately 50 feet wide by 12 feet deep with a capacity of 200,000 gallons. This unit receives stormwater runoff, boiler blowdown, and noncontact cooling water. The storm water runoff comes from the stormwater drainage system (SWMU #59). Under normal operating conditions, stormwater stored in this unit is pumped to the API separator (SWMU #62). This unit could conceivably contain any of the chemicals used at the facility. However, since production areas are curbed and storage areas are diked, the volume of chemical waste to total water volume would be relatively low.

Releases from this unit to soil, groundwater, and subsurface gas is possible because the unit is unlined. Releases to the air is also possible due to the volatile nature of the chemicals used at the plant. The potential for releases to surface water from this unit is low because excessive inflow is diverted to the industrial park drainage ditch offsite.

3.2.4 SWMU #63 - Wastewater Tank #2

This unit, a component of the wastewater treatment system, is a steel tank 12 feet in diameter and 15 feet high with an approximate capacity of 13,000 gallons. The tank receives waste directly from the production areas, then pumps its effluent directly to the aeration basin (SWMU #65). The unit is equipped with a sampling valve. The soil surface adjacent to and around this valve was observed to be stained. The unit is located on a concrete pad on top of an earthen dike which separates the aeration basin (SWMU# 65) and the polish pond (SWMU #68). The dike is sloped toward the two ponds in order to direct any spillage into the ponds.

Releases from this unit to soil, groundwater, and subsurface gas is possible because the soil below the unit is unlined, allowing any spillage to directly contact soil. The potential for releases to the air is low because of the volatility of the constituents present in the wastes managed at this site. The potential for releases to the surface water from this unit is also low because the area around the unit is diked, and releases would drain to either the aeration basin (SWMU #65) or the polish pond (SWMU #68).

3.2.5 SWMU #64 - Flow Equalization Basin

This unit, a component of the wastewater treatment system, is an 8,000,000 gallon basin measuring 295 feet x 353 feet x 15 feet deep. The unit is lined with bentonite clay, and receives wastes from the API separator (SWMU #62). The unit is equipped with a 25 horsepower aerator and circulates its waste to the aeration basin (SWMU #65). This unit could conceivably contain any of the wastes from the API separator (SWMU #63).

The potential for releases from this unit to the soil, groundwater, and subsurface gases depends largely on the integrity of the liner which is currently unknown. The potential for releases from this unit to the air is considered moderate because of the potentially volatile nature of the constituents of the waste managed by the unit and aeration operations. The potential for release from this unit to surface water is considered low because it is unlikely that any breaching or overflow would occur at this unit due to the considerable margin for error provided by the low operating capacity (2.0 million gallons) relative to the actual total capacity of the unit (8 million gallons).

3.2.6 SWMU #65 - Aeration Basin

This unit, a component of the wastewater treatment system, is a 600,000 gallon basin measuring 127 feet x 262 feet x 15 feet deep. The unit is lined with bentonite clay, and receives wastes from the flow equalization basin (SWMU #64) and wastewater tank #2 (SWMU #63). The aeration basin has a nine day retention time in which the contents are completely mixed using bottom-mounted aerators. Following treatment in the unit, wastewater is pumped to two rectangular clarifiers.

The potential for releases from this unit to the soil, groundwater, and subsurface gases depends largely on the integrity of the liner which is currently unknown. The potential for releases from this unit to the air is considered moderate because of the potentially volatile nature of the constituents of the waste managed by the unit and aeration operations. The potential for release from this unit to the surface water is considered low because it is unlikely that any breaching or overflow would occur at this unit due to the considerable margin for error provided by the low operating capacity (2.0 million gallons) relative to the actual total capacity of the unit (8 million gallons).

3.2.7 SWMU #68 - Polish Pond

This unit, a component of the wastewater treatment system, is a 4,000,000 gallon basin measuring 206 feet x 252 feet x 15 feet deep. The unit is lined with bentonite clay, and receives wastes from the clarifiers (SWMUs #66 & #67). The polish pond has a retention time of nine days, at which time the effluent is pumped 4.5 miles through an 8-inch, epoxy lined pipe to the Mississippi River where it is discharged at NPDES-permitted outfall #002.

The potential for releases from this unit to the soil, groundwater, and subsurface gases depends largely on the integrity of the liner which is currently unknown. The potential for releases from this unit to the air is considered moderate because of the potentially volatile nature of the constituents of the waste managed by the unit and aeration operations. The potential for release from this unit to surface water is considered low because it is unlikely that any breaching or overflow would occur at this unit due to the considerable margin for error provided by the low operating capacity (2.0 million gallons) relative to the actual total capacity of the unit (8 million gallons).

3.2.8 SWMU's #69-71 - Inactive Ponds #1, #2 & #3

These units are part of a three pond wastewater treatment system that was utilized at the site from 1970 to 1978. In 1978 the ponds were drained by a disposal contractor and filled with soils taken from the Cedar Chemical property. Ponds #1 and #2 were approximately 120 feet x 150 feet x 10 feet deep and Pond #3 was approximately 30 feet x 150 feet x 4 feet. The units were constructed of earthen fill and were not lined. Pond #3 also contained limestone for acid neutralization. The units received wastes from onsite production processes and some wastes generated offsite until 1978. The wastes managed at this site include propionic acid, calcium chloride solution, and neutralized sulfuric acid waste. This list does not include the wastes disposed of at this site by Helena Chemical Company, which are currently unknown and could have been any of the 100 to 200 compounds Helena Chemical used and formulated. Contamination of the surface and subsurface of the unit has been confirmed by EPA.

Releases from these units to soil, groundwater, and subsurface gas is possible because the units were never lined. The potential for air and surface water releases from this unit is considered low because the unit is now covered.

3.2.9 SWMU #72 - Drum Vault

This unit consists of a concrete vault with walls of poured concrete, a floor of gravel, sand, and possibly cement, and a concrete cap which forms the floor of the warehouse onsite. In addition to fill sand and gravel, the vault contains approximately 250 drums of solidified, low grade, herbicide which did not meet sale specifications. It is believed that the drums were placed in the vault in early 1976.

The potential for releases from this unit to the soil, groundwater, and subsurface gas is unknown because the materials and design used in building the vault are largely unknown. The potential for releases from this unit to the air and surface waters is unlikely because the vault is located below grade.

3.2.10 SWMU #73 - Buried Drums

Drums containing potentially hazardous materials have been discovered on the site. The drums were discovered during excavation of a drainage ditch onsite. The content and condition of the drums are unknown. A removal plan for the drums has been approved by the ADPC&E and will be implemented under the agreement established in the current CAO.

The potential threat to the environment is unknown because the contents and conditions of the drums is unknown; however, the condition of the drums can be determined following removal activities. If any of the drums have leaked hazardous materials, the proper assessment activities will be conducted to determine the nature and extent of impact to the surrounding property. These activities will be conducted separately from the Facility Investigation portion of the CAO.

3.2.11 SWMU #74 - Loading/Unloading Area (Railroad Spur)

This unit is an unlined section of ground covered with crushed stone underlying the railroad spur. It is approximately 30 feet by 300 feet. This unit receives wastes from unloading of raw materials and loading of product and waste by-products. The unit is located near the northern perimeter of the facility along the main tank farm. Staining was observed along the entire length of the unit during the VSI.

Releases from this unit to soil, groundwater, and subsurface gas is possible because the unit is unlined. The potential for releases from this unit to the air is moderate because there are volatile chemicals handled at this unit. The potential for release from this unit to surface water is low because the unit drains to the facility's stormwater drainage system (SWMU #60).

3.2.12 Area of Concern #1: Yellow Stain Areas

Areas of the facilities ground surface are covered with a yellow stain. These stains may originate from another company dumping a product (possibly dinitrobutylphenol) directly on the soil onsite. One of the stained areas was located north and east of the warehouse.

These stains are an indication of a release directly to the soil onsite. Since extensive soil staining is present it is possible that this contaminant may have impacted groundwater. The potential for release of subsurface gas or airborne contaminants depends on the volatility of the contaminant.

Table 3.1
SOLID WASTE MANAGEMENT UNITS
CEDAR CHEMICAL COMPANY

SWMU NUMBER	NAME	STATUS
1 & 2	Railroad Loading and Unloading Sumps	Active
3	Railroad Loading and Unloading Sump	Inactive
4	Production Areas #1 and #2 Drainage System and Sump	Active
5	Production Area #3 Drainage System and Sump	Active
6	Production Area #4 Drainage System and Sump	Active
7	Production Area #5 Drainage System and Sump	Inactive

Table 3.1
SOLID WASTE MANAGEMENT UNITS
CEDAR CHEMICAL COMPANY

SWMU NUMBER	NAME	STATUS
8	Boiler Blowdown Area Sump #1	Active
9	Boiler Blowdown Area Sump #2	Active
10	Laboratory Sump	Active
11	Sump Near Main Tank Farm	Active
12	Maintenance Shop Drainage System and Sump	Active
13	Truck Scale Sump	Active
14	Packaging Building Sump	Active
15-17	Air Emissions Scrubbers #01, #02, #03	Inactive
18	Air Emissions Scrubber #04	Active
19	Sump in Main Tank Farm Diked Area #1 (North)	Active
20	Sump in Main Tank Farm Diked Area #1 (South)	Active
21	Sump in Main Tank Farm Diked Area #2	Active
22	Sump in Main Tank Farm Diked Area #3	Active
23	Waste Storage Tank PE-209 in Main Tank Farm Diked Area #4	Active
24	Waste Storage Tank 002 in Main Tank Farm Diked Area #5	Active
25	Sump in Main Tank Farm Diked Area #6	Active
26	Sump in Main Tank Farm Diked Area #7	Active
27	Tank B-109 in Main Tank Farm Diked Area #7	Active
28	Waste Storage Tank B-112 in Main Tank Farm Diked Area #8	Inactive
29	Sump in Main Tank Farm Diked Area #9	Inactive
30	Waste Water Storage Tank B-102 in Main Tank Farm Diked Area #10	Active
31	Sump in Main Tank Farm Diked Area #11	Active

Table 3.1
SOLID WASTE MANAGEMENT UNITS
CEDAR CHEMICAL COMPANY

SWMU NUMBER	NAME	STATUS
32	Sump in Main Tank Farm Diked Area #12	Inactive
33	Tank N-204 in Main Tank Farm Diked Area #13	Active
34	Tank N-201 in Main Tank Farm Diked Area #14	Active
35	Tank N-205 in Main Tank Farm Diked Area #15	Active
36	Tank N-206 in Production Area #4	Active
37	Sump in Main Tank Farm Diked Area #16	Active
38	Sump in Main Tank Farm Diked Area #17	Inactive
39	Tank M-105 in Main Tank Farm Diked Area #17	Inactive
40	Sump in Main Tank Farm Diked Area #18	Inactive
41	Sump in Main Tank Farm Diked Area #19	Inactive
42	Sump in Second Tank Farm Diked Area #1	Active
43	Wastewater Tank 014 in Second Tank Farm Diked Area #3	Active
44	Hazardous Waste Storage Area	Inactive
45	Nonhazardous Waste Storage Area	Active
46	Drum Storage Area	Active
47	Drum Crushing Area	Active
48	Waste Drum Staging Area	Active
49	Scrap Drum Storage Wagons	Active
50	Waste Drum Staging Area in Main Tank Farm Area	Active
51	Waste Oil Drum	Active
52	Drums	Active
53	Solvent Cleaner Tank	Active
54	Miscellaneous Drum Storage	Active
55	Dumpsters	Active

Table 3.1 SOLID WASTE MANAGEMENT UNITS CEDAR CHEMICAL COMPANY		
SWMU NUMBER	**NAME**	**STATUS**
56	Laboratory Waste Rack Area	Active
57	Warehouse Drum Storage Area	Active
58	Loading/Unloading Dock Area	Active
59	Stormwater Drainage System	Active
60	Stormwater Sump	Active
61	Wastewater Tank #1 Wastewater Treatment System	Active
62	API Separator	Active
63	Wastewater Tank #2 Wastewater Treatment System	Active
64	Flow Equalization Basin	Active
65	Aeration Basin	Active
66	Clarifier #1	Active
67	Clarifier #2	Active
68	Polish Pond	Active
69	Inactive Pond #1	Inactive
70	Inactive Pond #2	Inactive
71	Inactive Pond #3	Inactive
72	Drum Vault	Inactive
73	Buried Drums	Inactive
74	Loading/Unloading Area (Railroad Spur)	Active

APPENDIX A

WASTE ANALYTICAL DATA

March 12, 1991

Cedar Chemical Corp.
P.O. Box 2749
West Helena, Arkansas 72390

Attn: Greg Satterfield

Entek #: 91-0685
Sample ID: #1

ANALYTICAL AND QUALITY CONTROL RESULTS

TCLP CHARACTERIZATION

SEMI-VOLATILES

Date/Time Analyzed: 3/05/91 (1600) Regulatory level
Date/Time analyzed: 3/05/91 (1825)

Parameter	Units (mg/L)	Amount Detected		Blank	%Variance Duplicate	%Spike Recovery Matrix	%Spike Recovery Control
o-cresol		<0.25		<0.005		NS	NS
m-cresol		<0.25		<0.005		NS	NS
p-cresol		<0.25		<0.005		NS	NS
Pentachlorophenol		<0.20		<0.004		*	151
2,4,5-Trichlorophenol		<0.15		<0.003		*	NS
2,4,6-Trichlorophenol		<0.15		<0.003		*	121
1,4-Dichlorobenzene		<0.20		<0.004		*	NS
2,4-Dinitrotoluene		<0.30	.13	<0.006		*	84.2
Hexachlorobenzene		<0.25	.13	<0.005		*	67.1
Hexachlorobutadiene		<0.45	.50	<0.009		*	12.7
Hexachloroethane		<0.10		<0.002		*	NS
Nitrobenzene		<0.10		<0.002		*	26.1
Pyridine		<0.25		<0.005		NS	NS

SURROGATE RECOVERY FOR SEMI-VOLATILES

	% Recovery
1. D6-Phenol	*
2. D2-Fluorophenol	*
3. 2,4,6-Tribromophenol	*
4. D,4 Terphenyl	*
5. 2-Fluorobiphenyl	*
6. D5-Nitrobenzene	*

* - No recovery due to dilution.

NS = Not Spiked

Analyzed by: Bobbie Kuntz
Bobbie Kuntz

Reviewed by: Ralph Vocque
Ralph Vocque
Laboratory Manager

December 23, 1991

Cedar Chemical Corporation
P.O. Box 2749
Hwy. 242 S.
West Helena, AR 72390

Attn: John Wagner

Entek #: 91-8311
Sample ID: #1

Date Received: 12/05/91 (1340)
Date Analyzed: 12/21/91 (1750)

ANALYTICAL AND QUALITY CONTROL RESULTS
TCLP CHARACTERIZATION

Parameter	Amount Detected	Blank	Precision %Variance	%Recovery Control	%Recovery Matrix
Base Neutrals					
Hexachlorobutadiene	<0.05#	<0.005	0.0	85.1	79.6
2-4-Dinitrotoluene	<0.05#	<0.005	0.0	109	75.8
Hexachlorobenzene	<0.05#	<0.005	0.0	103	41.6

Detection Limits raised due to dilution

All values are in mg/L.

* = No Recovery due to dilution

Internal Standards:
- d-4 Dichlorobenzene
- d-8 Naphthalene
- d-10 Acenaphthene
- d-10 Phenanthrene
- d-12 Chrysene
- d-12 Perylene

Surrogates:	% Recovery
d-5 Nitrobenzene	*
2-Fluorobiphenyl	*
d-14 Terphenyl	*

Analyzed by: Bobbie Hall
Bobbie Hall
Chemist

Reviewed by: Ralph Vocque RLG
Ralph Vocque
Laboratory Manager

RV

March 12, 1991

Cedar Chemical Corp.
P.O. Box 2749
West Helena, Arkansas 72390

Attn: Greg Satterfield

Entek #: 91-0685
Sample ID: #1

ANALYTICAL AND QUALITY CONTROL RESULTS

TCLP CHARACTERIZATION

VOLATILES

Date/Time Sampled: 2/11/91
Date/Time Received: 2/11/91 (1510)

Date/Time Analyzed: 2/26/91 (1640)

Parameter	Units (mg/L)	Amount Detected	Blank	*%Variance Duplicate	%Spike Recovery Matrix	%Spike Recovery Control
Benzene		<0.04	<0.04	--	83.5	93.3
Carbon Tetrachloride		<0.04	<0.04	--	97.8	98.0
Chlorobenzene		<0.04	<0.04	--	90.8	103
Chloroform		<0.04	<0.04	--	110	113
1,2-Dichloroethane		<0.04	<0.04	--	103	112
1,1-Dichloroethylene		<0.04	<0.04	--	118	69.6
Methyl Ethyl Ketone		<0.04	<0.04	--	NS	NS
Tetrachloroethene		<0.04	<0.04	--	90.9	102
Trichloroethene		<0.04	<0.04	--	93.1	101
Vinyl Chloride		<0.04	<0.04	--	NS	NS

SURROGATE RECOVERY FOR VOLATILES

	% Recovery
1. D4-Dichloroethane	83.4
2. D8-Toluene	82.7
3. Bromofluorobenzene	91.2

* This sample was not used as a duplicate.
NS = Not Spiked

Analyzed by: Connie Buckwalter
Connie Buckwalter

Reviewed by: Bobbie Kuntz
Bobbie Kuntz, Chemist

March 13, 1991

Cedar Chemical Corp.
P.O. Box 2749
West Helena, Arkansas 72390

Attn: Greg Satterfield

Entek # 91-0685
Sample ID #1

Date/Time Sampled: 2/11/91 (NS)
Date/Time Received: 2/11/91 (1510)

ANALYTICAL AND QUALITY CONTROL RESULTS

TCLP CHARACTERIZATION

Parameter	Units (mg/L)	Amount Detected	Blank	%Variance Duplicate	%Spike Recovery Matrix	Recovery Control
METALS						
Date/Time Analyzed: 2/27/91 (1430)						
Arsenic		<0.002	<0.002	0	105	105
Barium		6.68	<0.10	16	103	112
Cadmium		<0.01	<0.01	0	101	101
Chromium		<0.05	<0.05	0	94	97
Lead		<0.10	<0.10	0	100	95
Mercury		<0.002	<0.002	0	103	97
Selenium		<0.002	<0.002	0	96	103
Silver		0.07	<0.02	31	--	94

NS = Not Specified

Analyzed by: Rodney Williams
Rodney Williams

Analyzed by: Randy Davidson oAS
Randy Davidson

Reviewed by: Chester Sims
Chester Sims, Manager
Inorganic Analysis

APPENDIX B
GEOLOGICAL AND HYDROGEOLOGICAL
INVESTIGATION REPORTS

HYDROGEOLOGIC STUDY
CEDAR CHEMICAL CORPORATION
WEST HELENA, ARKANSAS

*   *   *

R e p o r t

t o

*   *   *

CEDAR CHEMICAL CORPORATION
West Helena, Arkansas

*   *   *

G R U B B S, G A R N E R & H O S K Y N, I N C.
Consulting Engineers
Little Rock, Arkansas

JULY 1988

Report Format

Presented in this report are the results and recommendations that have evolved and developed from this study. Initial sections of this report describe the field and laboratory phases. These sections are followed by a description of the geology, ground water conditions, and general site and soil conditions. Subsequent sections of this report present results and conclusions.

FIELD STUDIES

Sample Borings

Subsurface conditions at the site were explored as follows:

Boring No.	Ground Surface Elev.*	Completion Depth, ft	Completion Elevation
1	194.0	48	146.0
2	195.3	140	55.3
3	195.2	43	152.2
4	194.8	53	141.8
5	196.8	48	148.8
6	194.1	150	44.1
7	194.4	46	148.4

* Elevations are for top of concrete pad surrounding protective casing.

The approximate boring locations are shown on the Plan of Borings, Plate 2. The ground surface elevations for the borings were determined using benchmark El 200.2 for the top of rail above the existing concrete culvert. The stratigraphy and results of field and laboratory tests are summarized on the boring logs, Plates 3 through 11. A key to the terms and symbols used on the log forms is presented as Plate 12.

The sample borings were drilled using a truck-mounted rotary drilling rig. Soil samples were typically obtained at 2-ft intervals through the upper fine-grained soils and at 5-ft intervals below that.

Cohesive soils were sampled using a 3-inch diameter thin-walled tube hydraulically advanced into the soil. Granular soils were sampled using a 2-inch diameter split-barrel sampler. The values (N-values) presented in the "Blows Per Ft" column on the boring logs represent the number of blows of a 140-lb hammer falling 30 inches to drive the split-barrel sampler.

All soil samples were removed from the samplers in the field and were visually classified by our soil technician. Shear strengths of cohesive soils were estimated in the field using a calibrated hand penetrometer. The estimated cohesion values are plotted on the log forms, in tons per sq ft, as small circles enclosing an "x". The samples were then sealed in appropriate containers for transfer to our laboratory for further testing.

Piezometer Installation

Borings 1 through 7 were advanced using wet rotary drilling procedures. Potable water obtained from the city water supply system was used as the drilling fluid. Borings 2A, 3A, and 6A were advanced using dry auger procedures. The purpose of Borings 2A, 3A, and 6A was to evaluate ground water conditions within the upper fine-grained soil strata.

Piezometers were installed in each of the boreholes. The piezometer riser pipe and screen consisted of threaded PVC pipe. The screen openings were machine-cut 0.010-inch slots. No. 2 blast sand was used for the filter pack around the slotted screen. A single, approximately 3-ft seal was constructed above the sand fill using bentonite pellets. A cement/bentonite grout was placed from the top of the bentonite seal to the ground surface. Protective steel casing was then set into the grout to enclose the PVC riser. The piezometer installation details are shown on Plate 13.

Field Permeability Testing

Variable-head tests were conducted on selected piezometers using both falling-head and rising-head procedures. Estimated permeability values were computed using the data obtained and appropriate formulae (Hvorslev, U. S. Corps of Engineers, W.E.S.). The computed field permeability estimates are tabulated in a subsequent section of this report.

LABORATORY TESTING

Classification and Index Testing

Classification testing consisted of plastic and liquid limit tests and sieve analyses through the No. 200 sieve. The plastic and liquid limit and moisture content test results are plotted in accordance with the scale and symbols presented in the legend in the upper-right portion of each boring log form. The percentage of soil passing the No. 200 sieve is noted in the "Minus No. 200" column on the log forms. The results of the classification tests are summarized on Plates 14 through 16. Selected grain size curves are also shown graphically on Plate 17.

Permeability Tests

Laboratory permeability testing was conducted on undisturbed soil samples using falling-head test procedures.[1] In the falling-head test, de-aired water is allowed to flow under gravity through a specimen of known cross-sectional area, and the "head" loss is recorded. Computations are then performed for each test to determine the coefficient of permeability. The permeability test results are noted at appropriate depths on the log forms and are also tabulated on Plates 14 through 16.

SITE GEOLOGY

The project site is located in the Mississippi Embayment Physiographic Region. The surficial deposits at the site are composed of geologically recent alluvium of Quaternary Age. These deposits typically grade from silt and clay in the upper portion to sand with

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1 Test procedures in accordance with T. W. Lambe, Soil Testing for Engineers, John Wiley & Sons.

gravel in the lower part.

At the project site, the thickness of the fine-grained soil cap is in the order of 25 to 40 ft. Portions of these upper soils apparently consist of outwash from Crowley's Ridge, as evidenced by the relatively high silt content. These soils likely represent swale-fill and flood-basin deposits.

The lower portion of the Quaternary unit consists of silty and very fine-grained sand to coarse-grained sand with some gravel. The alluvium generally becomes more coarse-grained and cleaner with increasing depth. These sand units are apparently channel-lag, channel-bar, and point-bar deposits.

On the basis of our sample borings, the base of the Quaternary sands is near El 50 to 60 at the project site. As shown on the Structural Contour Map (Plate 18), the base of the alluvial aquifer slopes downward to the southwest away from Crowley's Ridge. The contours shown are based on boring data in conjunction with the available U. S. Geological Survey Well Data.

The Quaternary alluvium is underlain by the undifferentiated Jackson-Claiborne Group. This unit crops out on Crowley's Ridge in Phillips, Cross, St. Francis, and Lee Counties. The Jackson Group was deposited primarily under marine conditions and typically consists of gray, brown, and green silty clay with some lignite. The upper portion of the Claiborne Group typically consists of silty clay with some interbedding of thin and discontinuous beds of sand and lignite. The Jackson-Claiborne clays act as a confining bed under the alluvial aquifer.

The upper clay of the Claiborne Group is underlain by the Sparta Sand in Phillips County. Sparta Sand consists mainly of gray, very fine to medium sand with brown and gray sandy clay. Most of the formation was deposited as the beach of an advancing sea. According to available U.S.G.S. mapping, the top of the Sparta Sand is present near El -200 (approximately 400-ft depth). The thickness of the Sparta sand is in the order of 300 to 400 ft. The Sparta sand is the major deep ground water aquifer in the area. The potentiometric surface in the Sparta sand is near El 150, and the direction of flow is to the southwest.

WELL SURVEY

Domestic and industrial water supply in the area is obtained from the municipal system. As shown on Plate 19, the West Helena water supply is obtained from deep wells extending into the Sparta sand aquifer. According to U.S.G.S. information, the Sparta Sand well yields approximately 750 gallons per minute.

Wells within the Quaternary aquifer are present in the vicinity of the project site. These wells are used for irrigation and are in the order of 100 to 135 ft in depth. Yields range from approximately 700 to 1000 gallons per minute. The approximate well locations are shown on Plate 19. This information was obtained both from the U.S.G.S. files and from a local landowner.

GENERAL SOIL CONDITIONS

The stratigraphy encountered in the sample borings at the project site may be generalized as follows:

Stratum I: Interbedded very stiff to firm tan, gray, and brown silty clay (CL) and clayey silt (ML) was encountered at the ground surface over the project site to depths of 27 to 42 ft. The base of the upper fine-grained soils is near El 155 to 170. Coefficients of permeability in the silty clay portion were found to range from 8.5×10^{-8} to 3.0×10^{-7} cm/sec. In the clayey silt portions, the coefficients of permeability were found to range from 2.5×10^{-7} to as high as 4.0×10^{-5} cm/sec;

Stratum II: Medium dense to dense silty fine sand was encountered beneath Stratum I to depths of 134 to 143 ft. As shown on Plate 18, the base of the alluvial sand is at El 51 to 61 over the site. The upper portions of this stratum were found to be very fine-grained with a high silt content. Below depths of approximately 50 ft, the alluvium was found to generally consist of relatively clean fine to coarse sand with some gravel. As a consequence, the lower portions of the sand are of much higher permeability. The permeability of this stratum is discussed in a subsequent section of this report; and

Stratum III: The basal stratum was found to consist of very stiff dark gray sandy clay with lignite. We anticipate that the coefficient of permeability of this stratum is less than 1.0×10^{-7} cm/sec.

To assist in discussion and visualization of subsurface stratigraphy, two (2) Generalized Soils Profiles were prepared and are shown on Plates 20 and 21. These profiles are considered to be representative of overall conditions. In using the profiles, it should be understood that the subsurface stratigraphy between borings was inferred from conditions encountered in the borings. Variations in stratigraphy and soil conditions should be anticipated. Additionally, the natural transition between alluvial soil types present at the site is generally gradual, and the indicated boundaries cannot be considered as precise.

RESULTS AND CONCLUSIONS

Hydraulic Conductivity

The hydraulic conductivity of the alluvial aquifer was estimated using both field and laboratory testing procedures. The results of the field variable-head ("slug") tests are as follows:

Piezometer No.	Depth of Interval Tested, ft	Type	Estimated Coefficient of Permeability, cm/sec
1	38 - 48	falling-head	3.6×10^{-5}
2	125 - 135	falling-head	2.4×10^{-2}
3	33 - 43	falling-head	2.1×10^{-4}
4	42 - 52	falling-head	2.8×10^{-5}
5	38 - 48	falling-head	5.1×10^{-5}
6	138 - 148	falling-head	2.5×10^{-2}
7	35 - 45	falling-head	7.1×10^{-4}
		rising-head	4.6×10^{-4}

As shown, the hydraulic conductivity of the deeper sands is in the order of 2.5×10^{-2} cm/sec. The hydraulic conductivity of the upper more fine-grained silty sands, however, is in the order of 3.0×10^{-5} to 5.0×10^{-4} cm/sec.

On the basis of grain size curves and the Hazen Formula, the permeability of the deeper sand units is in the order of 1.0×10^{-2} to 4.0×10^{-2} cm/sec. The hydraulic conductivity of the aquifer was also computed using a well formula for the yield and depth of the nearby irrigation well. On that basis, we computed a hydraulic conductivity of 3.0×10^{-2} cm/sec.

In summary, it appears that the hydraulic conductivity of the cleaner sand is approximately 3.0×10^{-2} cm/sec. Published data, however, indicates higher hydraulic conductivities in other portions of Phillips County. The lower hydraulic conductivity obtained at the site is apparently related to the silty and relatively fine-grained character of the sand.

The hydraulic conductivities of the upper silty clay and clayey silt soils were found to be quite variable. The cleaner and predominantly silt soils possess much higher conductivities than the silty clay soils. Hydraulic conductivities as high as 4.0×10^{-5} cm/sec were obtained for Boring 6.

Ground Water Movement Why are these water depths different from those in Plates

The ground water levels obtained on June 22, 1988 are as follows:

These are made on the same day - others on the day they were drilled.

Piezometer No.	Ground Surface Elevation	Water Depth, ft		Water Elevation	
1	194.0	27.9 ✓		166.1 ✓	
2	195.3	28.9	27.0	166.4	168.3
2A	195.4	Dry		-	
3	195.2	28.9	29	166.3	166.2
3A	195.2	Dry		-	
4	194.8	28.8	27	166.0	167.8
5	196.8	30.2 ✓		166.6 ✓	
6	194.1	28.3	26	165.8	168.1
6A	194.0	11.7		182.3	
7	194.4	28.2	26	166.2	168.4

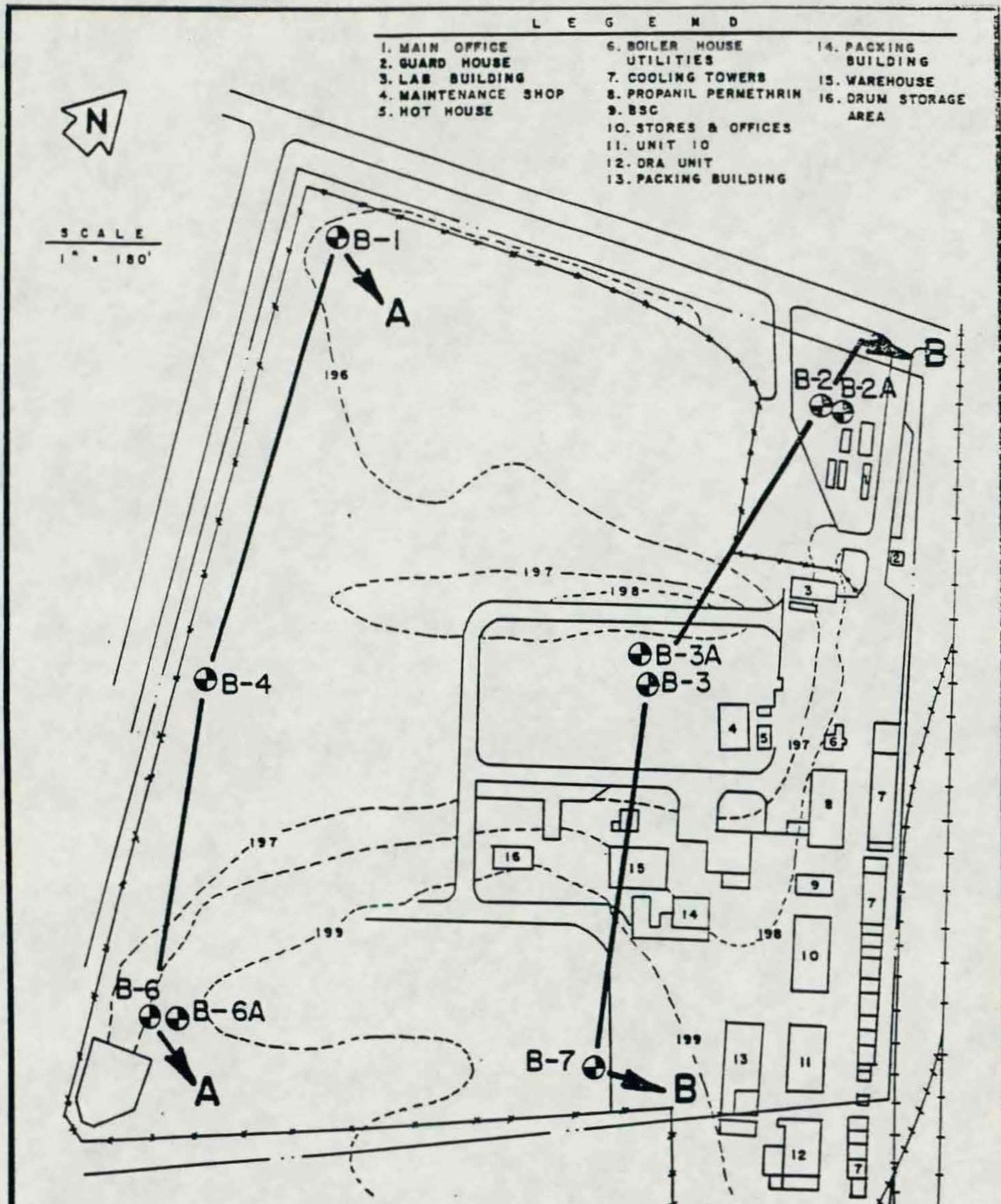
The potentiometric surface contours for June 22, 1988 are shown on Plate 22. The potentiometric surface slopes from El 166.6 in the eastern portion of the plant site to near El 165.8 near the southwest corner. In other words, the ground water surface is sloping generally to the southwest.

The data obtained in this study correlates relatively well with the Potentiometric Surface Map by the U. S. Geological Survey for fall of 1985. The regional direction of ground water flow was generally to the southwest towards a depression around and near the city of DeWitt.

As discussed previously, our analyses would indicate that the hydraulic conductivity of the deeper Quaternary sands is in the order of 3.0×10^{-2} cm/sec. Based on recorded water levels, we computed an average hydraulic gradient across the site of 0.0006. Using the aforementioned hydraulic conductivity and an average saturated thickness of 27 meters (90 ft), we computed a transmissivity of 700 m^2 per day (7650 ft^2 per day). The velocity of flow through the sand aquifer is computed to be on the order of 0.02 meters per day (0.05 ft per day).

Published data indicates that the transmissivity of the alluvial aquifer in Phillips County is generally in the order of 34,000 to 35,000 ft^2 per day. At the site, however, the transmissivity is apparently reduced by the lower hydraulic conductivity of the fine sand and silty fine sand soils. Also, the transmissivity of the upper very silty fine sand soils was neglected in our computations. Due to the high silt content of this upper zone, the contribution to the overall transmissivity is relatively minor.

The recommended monitoring well locations are shown on Plate 22. These well locations are based on the recorded potentiometric surface of June, 1988 and the plant facility locations. These monitoring wells should be constructed to monitor the sand of the alluvial aquifer. Also, one (1) shallow well should be installed to monitor ground water quality within the "perched" ground zone observed in Piezometer 6A.



PLAN OF BORINGS

CEDAR CHEMICAL COMPANY
WEST HELENA, ARKANSAS

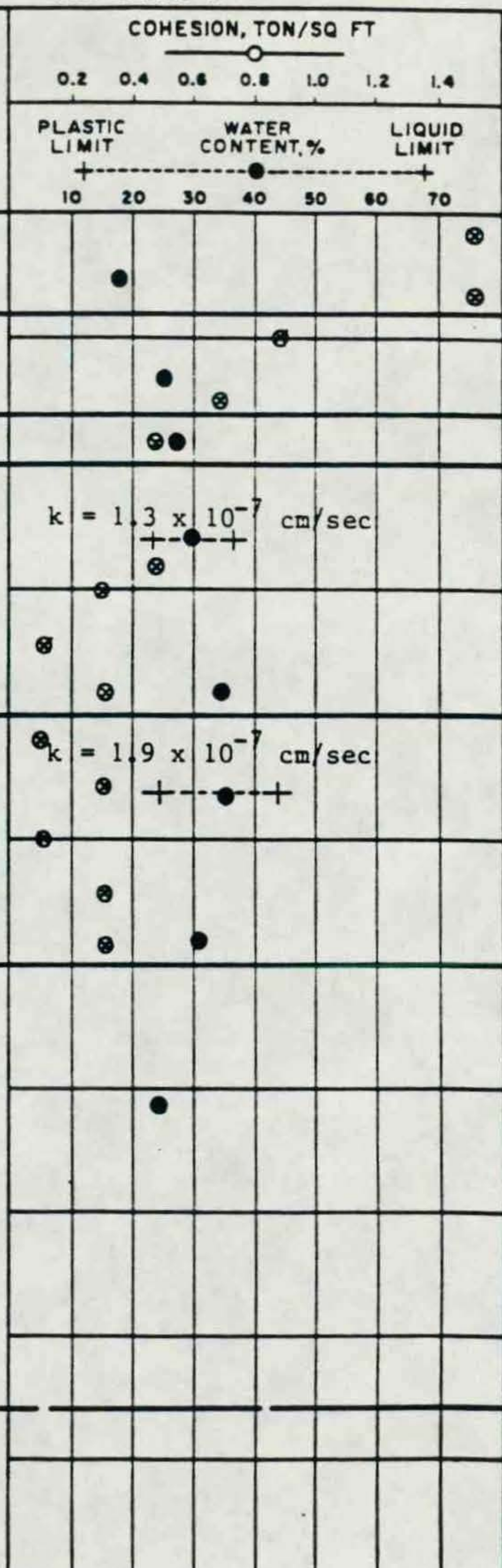
LOG OF BORING NO. 1

Cedar Chemical Company
West Helena, Arkansas

TYPE: Wash **LOCATION:** See Plate 1

SURF. EL: 194.0

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	– No. 200, %
0–4	Very stiff to stiff brown clayey silt w/ferrous stains			
4–8	Stiff brown and tan silty clay			
8–10	Firm to stiff tan and gray clayey silt			
10–20	Firm brown and gray silty clay w/ferrous stains		93	100
20–30	Medium dense brown and gray clayey silt w/ferrous stains Gray below 24 ft		85	98
30–48	Medium dense brown and gray silty fine sand	22 29		



COMPLETION DEPTH: 48 ft
DATE: 6/15/88

DEPTH TO WATER IN BORING: 27.9 ft **DATE:** 6/22/88

Grubbs, Garner & Hoskyn, Inc.
Consulting Engineers

LOG OF BORING NO. 2

Cedar Chemical Company
West Helena, Arkansas

TYPE: Wash

LOCATION: See Plate 1

SURF. EL: 195.3

COHESION, TON/SQ FT: 0.2 0.4 0.6 0.8 1.0 1.2 1.4

PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT: 10 20 30 40 50 60 70

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	– No. 200, %
0–5	Stiff to very stiff tan clayey silt			
5–12	Stiff brown and tan silty clay		95	98
12–16	Firm brown clayey silt			100
16–27	Firm to soft gray and brown silty clay to very silty clay w/ferrous stains and rootlets Gray below 24 ft			
27–	Dense tan and gray silty fine sand w/gray sandy silt seams at 29 to 30 ft	37		
35		51		
40		48		7
45		50		
48–	-fine to medium sand below 48 ft			
50		78/15"		
55		75/13"		

$k = 3.0 \times 10^{-7}$ cm/sec

COMPLETION DEPTH: 140 ft
DATE: 6/8/88

DEPTH TO WATER IN BORING: 27 ft
DATE: 6/8/88

Grubbs, Garner & Hoskyn, Inc.
Consulting Engineers

LOG OF BORING NO. 2 (CONT.)

Cedar Chemical Company
West Helena, Arkansas

TYPE: Wash

LOCATION: See Plate 1

SURF. EL: 195.3

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	PLASTIC LIMIT / WATER CONTENT, % / LIQUID LIMIT (10–70); COHESION, TON/SQ FT (0.2–1.4)	– No. 200, %
60		48			
		50			
70	Some gravel 72 to 72.5 ft and 75 to 78 ft	53			
		50			
80		82/13"			
		78/15"			
90		83/13"			
	Some gravel at 97 to 103 ft	80/13"			
100		50/6"			
	Gravel frequent 106 to 107 ft	50/6"			
110		37			
		80/15"			
120		50/4"			
		50/4"			
130		50/4"			
	Very stiff dark gray sandy clay and silty clay	40		●	56
140	-w/light gray sand pockets	41		+--●----+	

COMPLETION DEPTH: 140 ft
DATE: 6/8/88

DEPTH TO WATER IN BORING: 27 ft
DATE: 6/8/88

Grubbs, Garner & Hoskyn, Inc.
Consulting Engineers

LOG OF BORING NO. 3

Cedar Chemical Company
West Helena, Arkansas

TYPE: Wash

LOCATION: See Plate 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL (SURF. EL: 195.2)	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (0.2 0.4 0.6 0.8 1.0 1.2 1.4); PLASTIC LIMIT, WATER CONTENT, %, LIQUID LIMIT (10 20 30 40 50 60 70)	− No. 200, %
			Fill: Crushed stone and silty clay				
5			Stiff brown silty clay with ferrous stains and clayey silt pockets and seams (odor)				
10						k = 8.5 x 10^{-8} cm/sec	100
15			Stiff to firm gray and tan clayey silt to very silty clay -less clayey below 18 ft (odor)		93	k = 1.9 x 10^{-6} cm/sec	99
20			Firm gray and brown very silty clay w/ferrous stains (odor)				
25			Firm to soft brown and tan clayey silt w/ferrous stains Gray below 28 ft w/some fine sand	23			
30			Medium dense to dense gray silty fine sand (wet)	28			
35				32			
40				38			18
45							

COMPLETION DEPTH: 43 ft
DATE: 6/20/88

DEPTH TO WATER IN BORING: 29 ft

DATE: 6/20/88

Grubbs, Garner & Hoskyn, Inc.
Consulting Engineers

LOG OF BORING NO. 5

Cedar Chemical Company
West Helena, Arkansas

TYPE: Wash

LOCATION: See Plate 1

SURF. EL: 196.8

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT / PLASTIC LIMIT – WATER CONTENT, % – LIQUID LIMIT	– No. 200, %
0–5	Very stiff gray and tan very silty clay to clayey silt				
				$k = 4.9 \times 10^{-6}$ cm/sec	
6.5	Stiff tan silty clay		96		100
8	Stiff tan clayey silt				
12	Firm brown and tan silty clay (Moist) to clayey silt				
20	Firm gray and brown silty clay w/ferrous stains				
28	Firm gray and tan clayey silt -w/some fine sand				
33	Dense tan silty fine sand	32			
		45			
		40			

COMPLETION DEPTH: 48 ft
DATE: 6/17/88

DEPTH TO WATER IN BORING: 30.2 ft

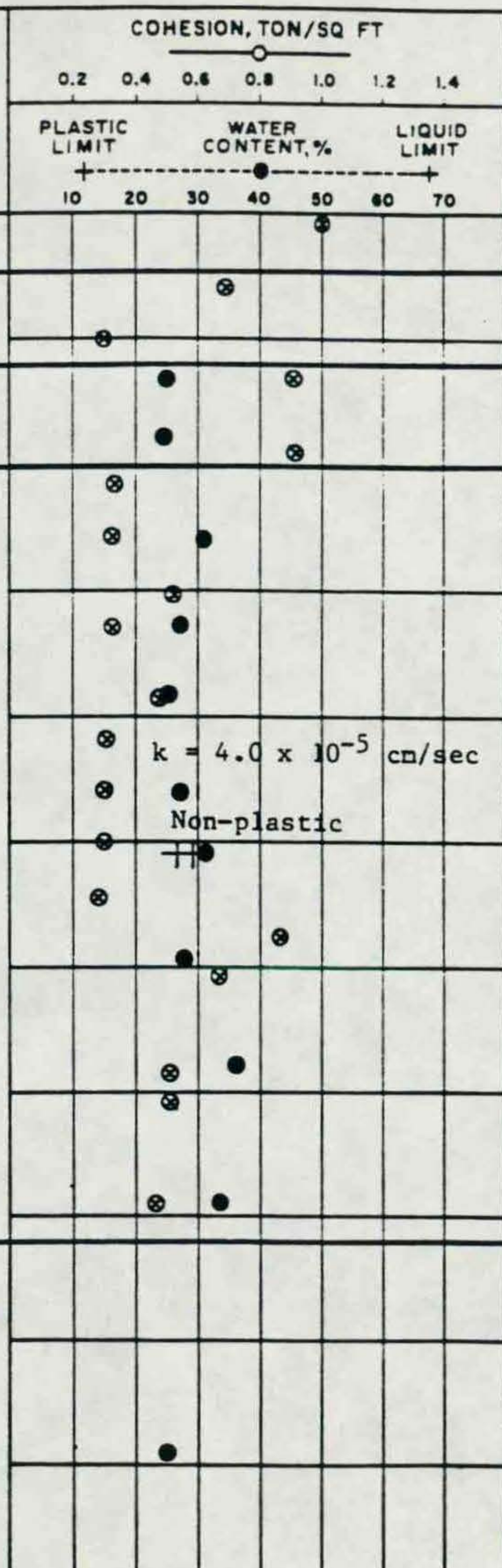
DATE: 6/22/88

LOG OF BORING NO. 6

Cedar Chemical Company
West Helena, Arkansas

TYPE: Wash **LOCATION:** See Plate 1

DEPTH, FT	DESCRIPTION OF MATERIAL (SURF. EL: 194.1)	BLOWS PER FT	UNIT DRY WT LB/CU FT	- No 200, %
0–2	Stiff to soft brown silty clay w/clayey silt pockets			
2–6	Stiff to firm tan clayey silt w/ferrous nodules			
6–10	Stiff gray and brown silty clay w/ferrous stains and clayey silt pockets (odor)			
10–40	Firm gray and tan clayey silt (odor above 17 ft)			
			95	100
				100
	-gray w/some silty clay seams below 28 ft			
40–	Dense gray silty fine sand -less silty and coarser with increasing depth			
		36		
		40		
		46		



COMPLETION DEPTH: 150 ft
DATE: 6/13/88

DEPTH TO WATER IN BORING: 26 ft **DATE:** 6/13/88

Grubbs, Garner & Hoskyn, Inc.
Consulting Engineers

LOG OF BORING NO. 6 (CONT.)

Cedar Chemical Company
West Helena, Arkansas

TYPE: Wash

LOCATION: See Plate 1

SURF. EL: 194.1

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	– No. 200, %
60	-fine to medium sand below 57 ft	51		3
		56		
70		83/10"		
	-tan and gray w/some gravel below 76 ft	78/12"		
80		51		
		60		
90		57		
		50/7"		
100		56		
		78/15"		
110	-mostly fine sand 108 to 112 ft	50/7"		
		50/6"		
120		50		9
		77/16"		
130		72/14"		
140		80/11"		
	Very stiff dark gray sandy clay w/lignite layers	50/7"		
150		70/16"		

COHESION, TON/SQ FT: 0.2 0.4 0.6 0.8 1.0 1.2 1.4

PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT: 10 20 30 40 50 60 70

COMPLETION DEPTH: 150 ft
DATE: 6/13/88

DEPTH TO WATER IN BORING: 26 ft

DATE: 6/13/88

Grubbs, Garner & Hoskyn, Inc.
Consulting Engineers

PLATE 10

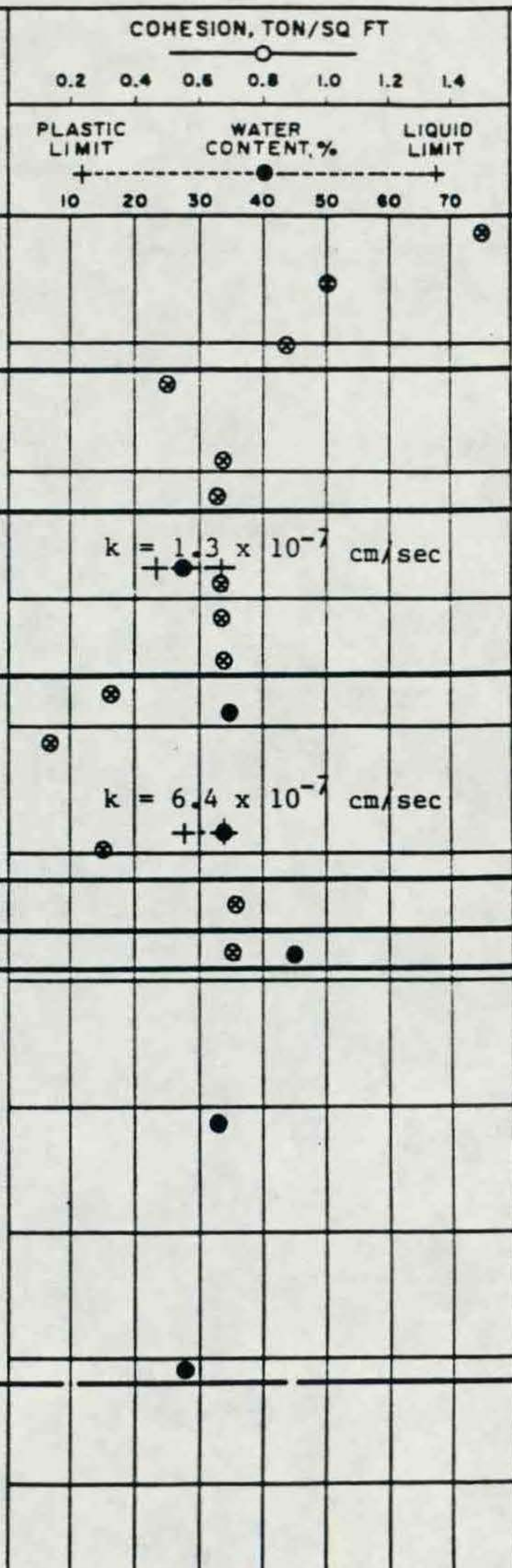
LOG OF BORING NO. 7

Cedar Chemical Company
West Helena, Arkansas

TYPE: Wash **LOCATION:** See Plate 1

SURF. EL: 194.4

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	– No 200, %
0–5	Very stiff to stiff brown and tan silty clay w/ferrous stains and clayey silt pockets and seams Brown and gray below 4 ft			
5–12	Stiff brown and tan clayey silt w/ferrous stains			
12–18	Stiff tan very silty clay -w/clayey silt seams		92	99
18–27	Soft to firm gray and tan to very silty clay to clayey silt w/ferrous stains		90	97
27–29	Medium dense light gray fine sandy silt w/ferrous stains			
29–30	Stiff dark gray sandy clay w/shells			
30–46	Dense tan and gray silty fine sand (wet) -gray below 30 ft	32 38 43		



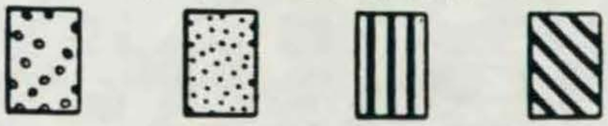
COMPLETION DEPTH: 46 ft
DATE: 6/16/88

DEPTH TO WATER IN BORING: 26 ft
DATE: 6/16/88

Grubbs, Garner & Hoskyn, Inc.
Consulting Engineers

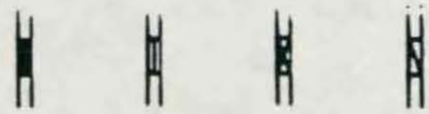
SYMBOLS AND TERMS USED ON BORING LOGS

SOIL TYPES
(SHOWN IN SYMBOL COLUMN)



Gravel Sand Silt Clay
Predominant type shown heavy

SAMPLER TYPES
(SHOWN IN SAMPLES COLUMN)



Shelby Tube Piston Split Spoon No Recovery

TERMS DESCRIBING CONSISTENCY OR CONDITION

COARSE GRAINED SOILS (major portion retained on No 200 sieve). Includes (1) clean gravels and sands, and (2) silty or clayey gravels and sands. Condition is rated according to relative density, as determined by laboratory tests.

DESCRIPTIVE TERM	RELATIVE DENSITY
Loose	0 to 40%
Medium dense	40 to 70%
Dense	70 to 100%

FINE GRAINED SOILS (major portion passing No 200 sieve). Includes (1) inorganic and organic silts and clays, (2) gravelly, sandy, or silty clays and (3) clayey silts. Consistency is rated according to shearing strength, as indicated by penetrometer readings or by unconfined compression tests.

DESCRIPTIVE TERM	UNCONFINED COMPRESSIVE STRENGTH TON/SQ FT
Very soft	less than 0.25
Soft	0.25 to 0.50
Firm	0.50 to 1.00
Stiff	1.00 to 2.00
Very stiff	2.00 to 4.00
Hard	4.00 and higher

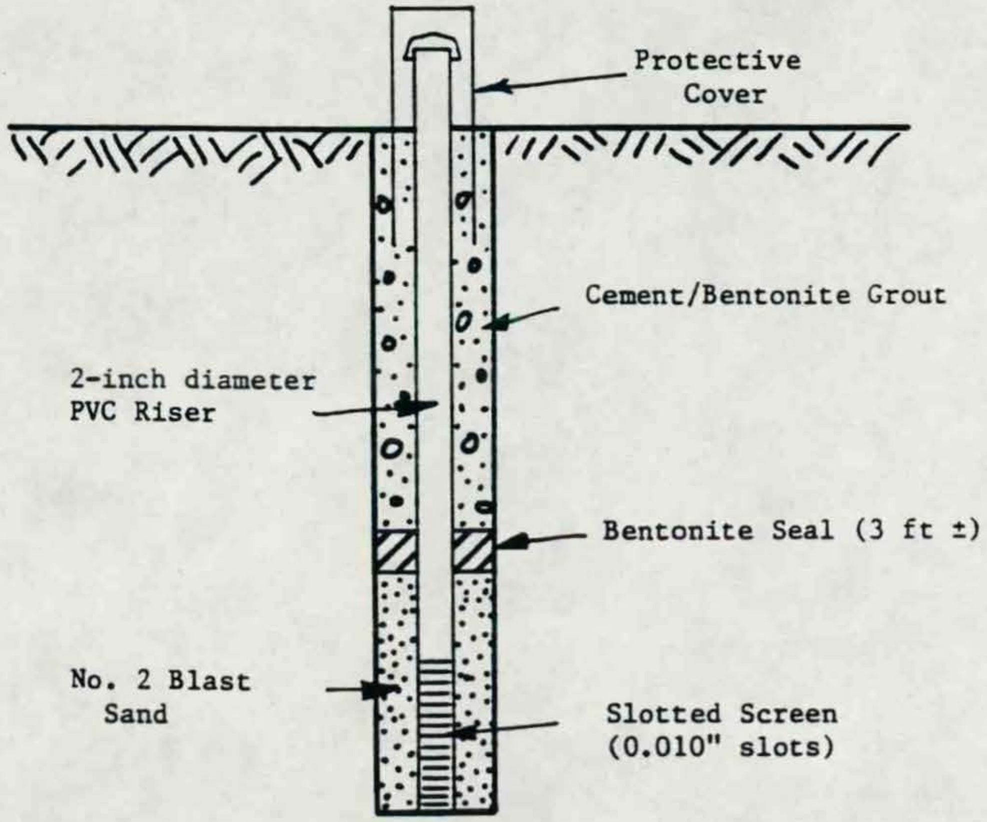
Note: Slickensided and fissured clays may have lower unconfined compressive strengths than shown above because of planes of weakness or cracks in the soil. The consistency ratings of such soils are based on penetrometer readings.

TERMS CHARACTERIZING SOIL STRUCTURE

Slickensided	– having inclined planes of weakness that are slick and glossy in appearance.
Fissured	– containing shrinkage cracks, frequently filled with fine sand or silt; usually more or less vertical.
Laminated	– composed of thin layers of varying color and texture.
Interbedded	– composed of alternate layers of different soil types.
Calcareous	– containing appreciable quantities of calcium carbonate.
Well graded	– having wide range in grain sizes and substantial amounts of all intermediate particle sizes.
Poorly graded	– predominantly of one grain size, or having a range of sizes with some intermediate size missing.

Terms used in this report for describing soils according to their texture or grain size distribution are in accordance with the UNIFIED SOIL CLASSIFICATION SYSTEM, as described in Technical Memorandum No 3-357, Waterways Experiment Station, March 1953.

PIEZOMETER NO.	GROUND SURFACE ELEVATION	SCREENED INTERVAL		FILTER SAND	
		DEPTH, FT.	ELEVATION	DEPTH, FT.	ELEVATION
1	194.0	38 - 48	156 - 146	29 - 48	165 - 146
2	195.3	125 - 135	70 - 60	28 - 140	167 - 55
2A	195.4	11 - 16	184 - 179	9 - 16	186 - 179
3	195.2	33 - 43	162 - 152	24 - 43	171 - 152
3A	195.2	13 - 18	182 - 177	11 - 18	184 - 177
4	194.8	42 - 52	153 - 143	32 - 53	163 - 142
5	196.8	38 - 48	167 - 149	30 - 48	159 - 149
6	194.1	138 - 148	56 - 46	40 - 150	154 - 44
6A	194.0	19 - 24	175 - 170	17 - 24	177 - 170
7	194.4	35 - 45	159 - 149	27 - 46	167 - 148



PIEZOMETER INSTALLATION DETAILS

SUMMARY OF CLASSIFICATION TESTS

PROJECT: Cedar Chemical Company SITE: West Helena, Arkansas

SAMPLED FROM	LOCATION DEPTH, FT.	WATER CONTENT PERCENT (NATURAL)	L.L.	P.L.	P. I.	MECHANICAL ANALYSIS PERCENT FINER 3 IN.	3/4 IN.	3/8 IN.	NO. 4	NO. 10	NO. 40	NO. 200	PERMEABILITY, k_v cm/sec	CLA FICA UNIF
B-1	13 - 13.5	29.6	37	24	13	-	-	-	-	-	-	100	1.3×10^{-7}	CI
	23 - 23.5	34.5	45	25	20	-	-	-	-	100	99	98	1.9×10^{-7}	CI
B-2	7 - 7.5	27.1	38	24	14	-	-	-	-	-	100	98	3.0×10^{-7}	CI
	13 - 13.5	30.4				-	-	-	-	-	-	100		MI
	39 - 40	22.9				-	-	-	-	100	99	7		SI
	134 - 135	21.1				-	-	-	100	99	97	56		CI
	139 - 140	24.3	40	16	24									CL
B-3	9 - 9.5	25.6	39	24	15	-	-	-	-	-	-	100	8.5×10^{-8}	CL
	17 - 17.5	28.6	32	26	6	-	-	-	-	-	100	99	1.9×10^{-6}	ML

SUMMARY OF CLASSIFICATION TESTS

PROJECT: Cedar Chemical Company SITE: West Helena, Arkansas

SAMPLED FROM	LOCATION DEPTH, FT.	WATER CONTENT PERCENT (NATURAL)	L.L.	P.L.	P.I.	MECHANICAL ANALYSIS PERCENT FINER 3 IN.	3/4 IN.	3/8 IN.	NO. 4	NO. 10	NO. 40	NO. 200	PERMEABILITY, k_v cm/SEC	CLASSIFICATION UNIT
B-3	40.5 - 41.5	25.3				–	–	–	–	100	99	18		SM
B-4	9 - 9.5	22.9	33	26	7	–	–	–	100	97	92	90	2.5×10^{-7}	ML
	27 - 27.5	27.8	28	26	2	–	–	–	–	–	–	100	1.6×10^{-6}	ML
B-5	7 - 7.5	24.0	36	26	10	–	–	–	–	–	–	100	4.9×10^{-6}	ML
	10.5 - 11	29.1	30	28	2									ML
B-6	23 - 23.5	28.1	Non-plastic			–	–	–	–	–	–	100	4.0×10^{-5}	ML
	25 - 25.5	30.5	29	28	1	–	–	–	–	–	–	100		ML
	59 - 60	19.4				–	–	–	–	100	77	3		SP
	119 - 120	23.0				–	100	93	93	91	61	9		SP

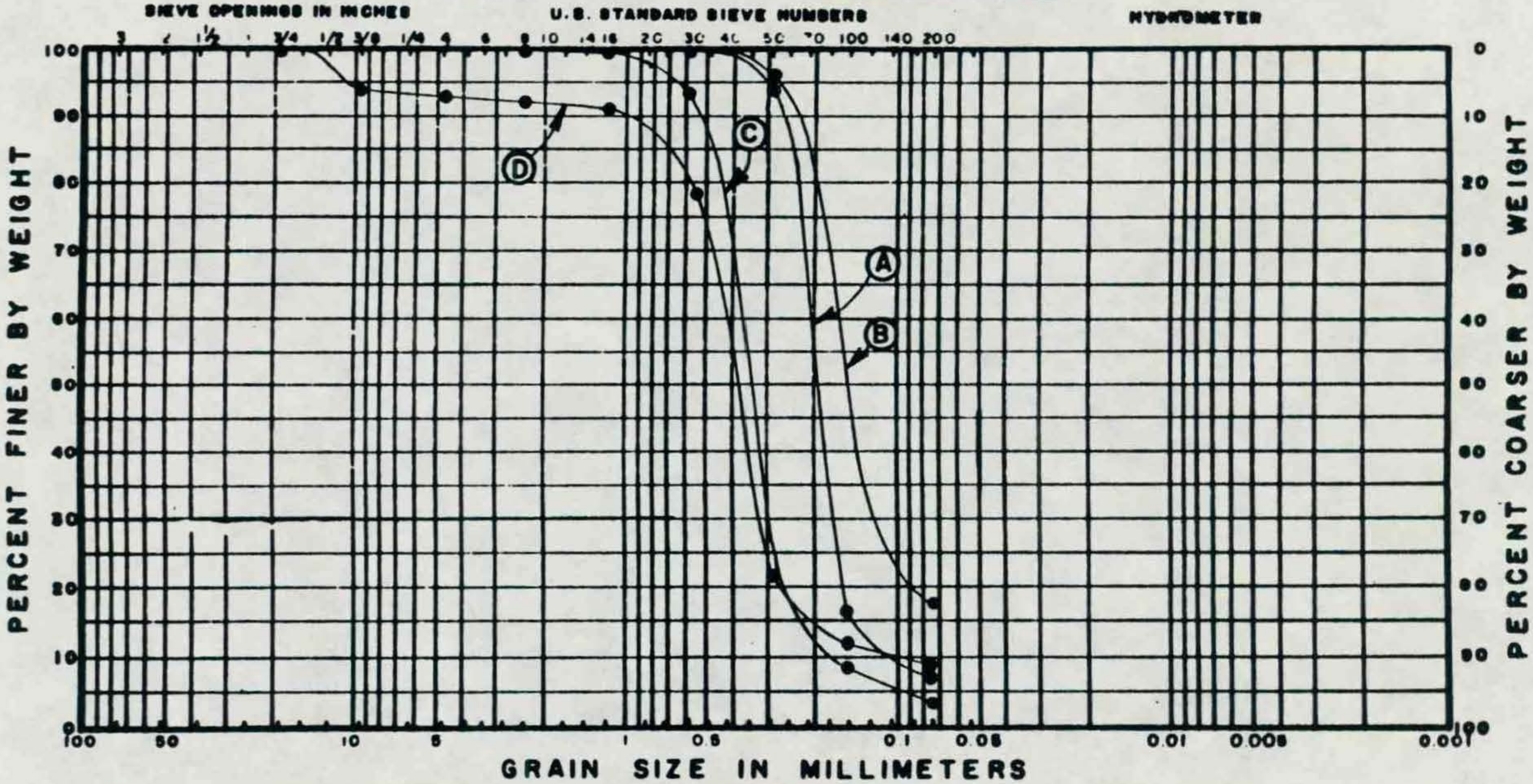
PLATE

SUMMARY OF CLASSIFICATION TESTS

PROJECT: Cedar Chemical Company SITE: West Helena, Arkansas

SAMPLED FROM	LOCATION DEPTH, FT.	WATER CONTENT PERCENT (NATURAL)	L.L.	P.L.	P.I.	MECHANICAL ANALYSIS PERCENT FINER 3 IN.	3/4 IN.	3/8 IN.	NO. 4	NO. 10	NO. 40	NO. 200	PERMEABILITY k_v cm/SEC	CLA FICA UNI
B-6	143.5 - 144	101.6				–	–	100	84	53	18	2	(lignite)	
B-7	13 - 13.5	28.6	34	24	10	–	–	–	–	–	100	99	1.3×10^{-7}	CL ML
	24.5 - 25.5	33.1	32	26	6	–	–	–	–	100	98	97	6.4×10^{-7}	ML

GRAIN SIZE CURVES



GRAVEL		SAND			SILT OR CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE	BORING	DEPTH, FT	D_{10}, cm	ESTIMATED PERMEABILITY,* cm/sec
A	2	39 - 40	0.011	1.2×10^{-2}
B	3	40.5 - 41.5	0.003±	9×10^{-4}
C	6	59 - 60	0.019	3.6×10^{-2}
D	6	119 - 120	0.011	1.2×10^{-2}

*Based on Hazen Formula

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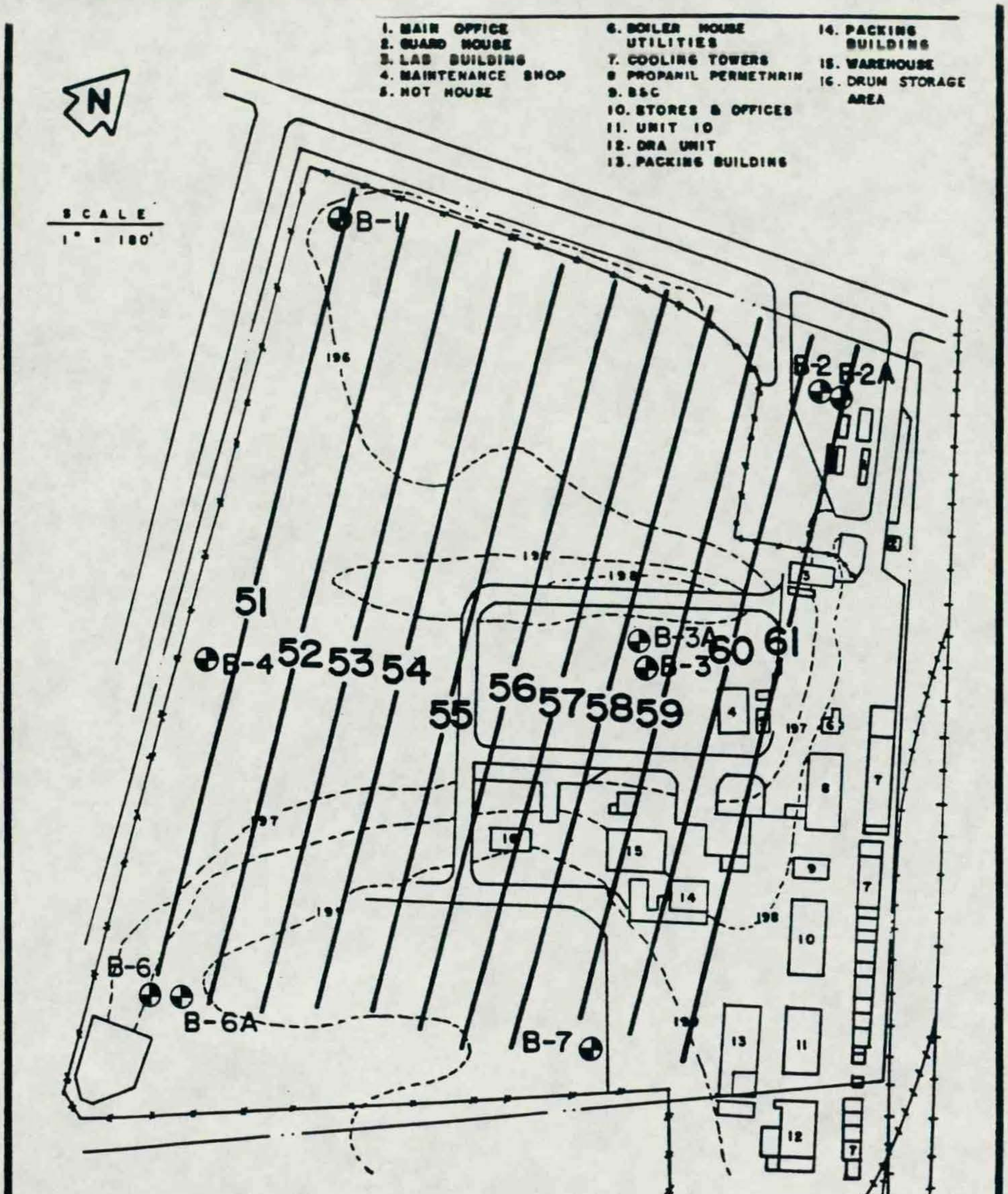
Consulting Engineers



STRUCTURAL CONTOUR MAP

BASE OF ALLUVIAL AQUIFER

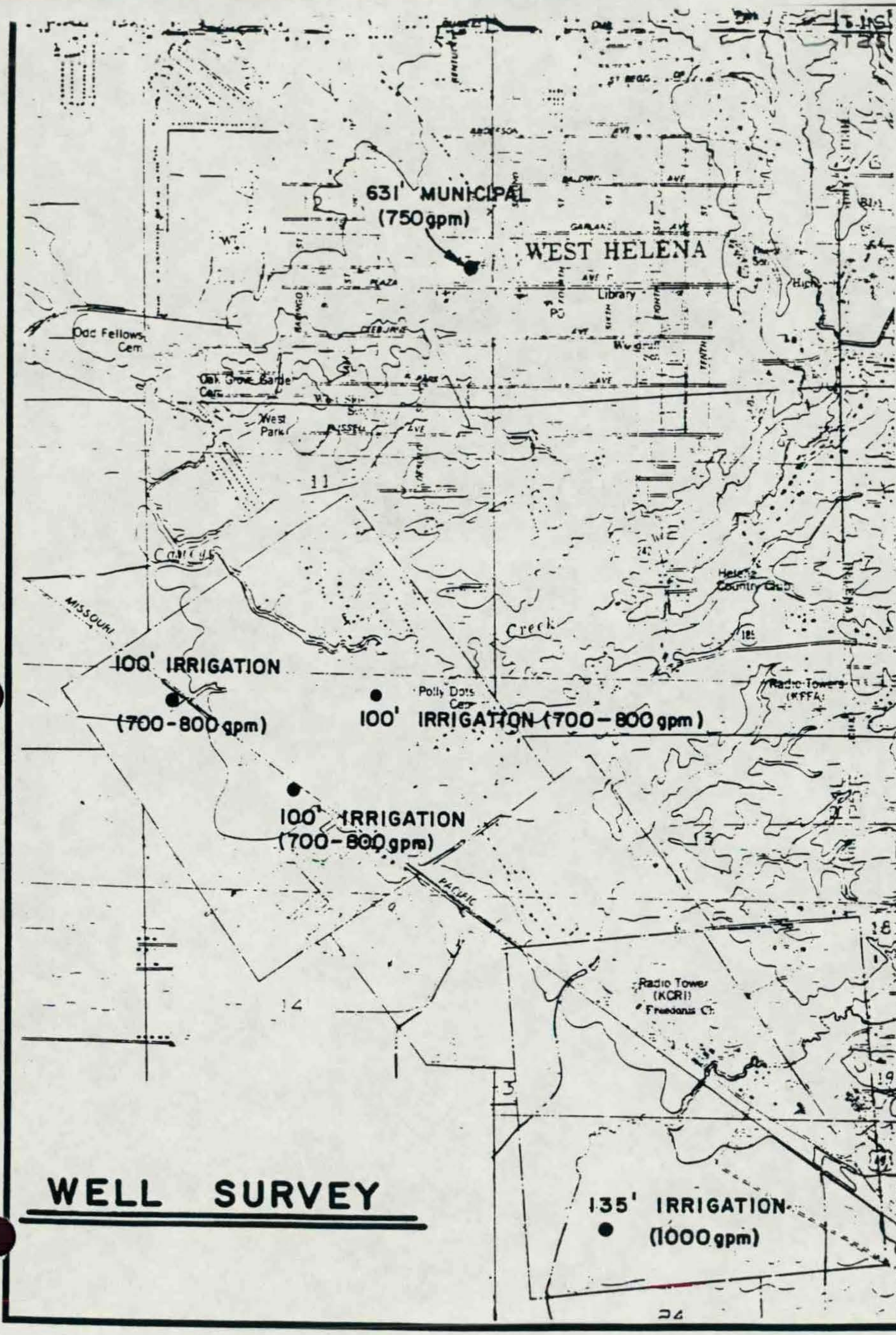
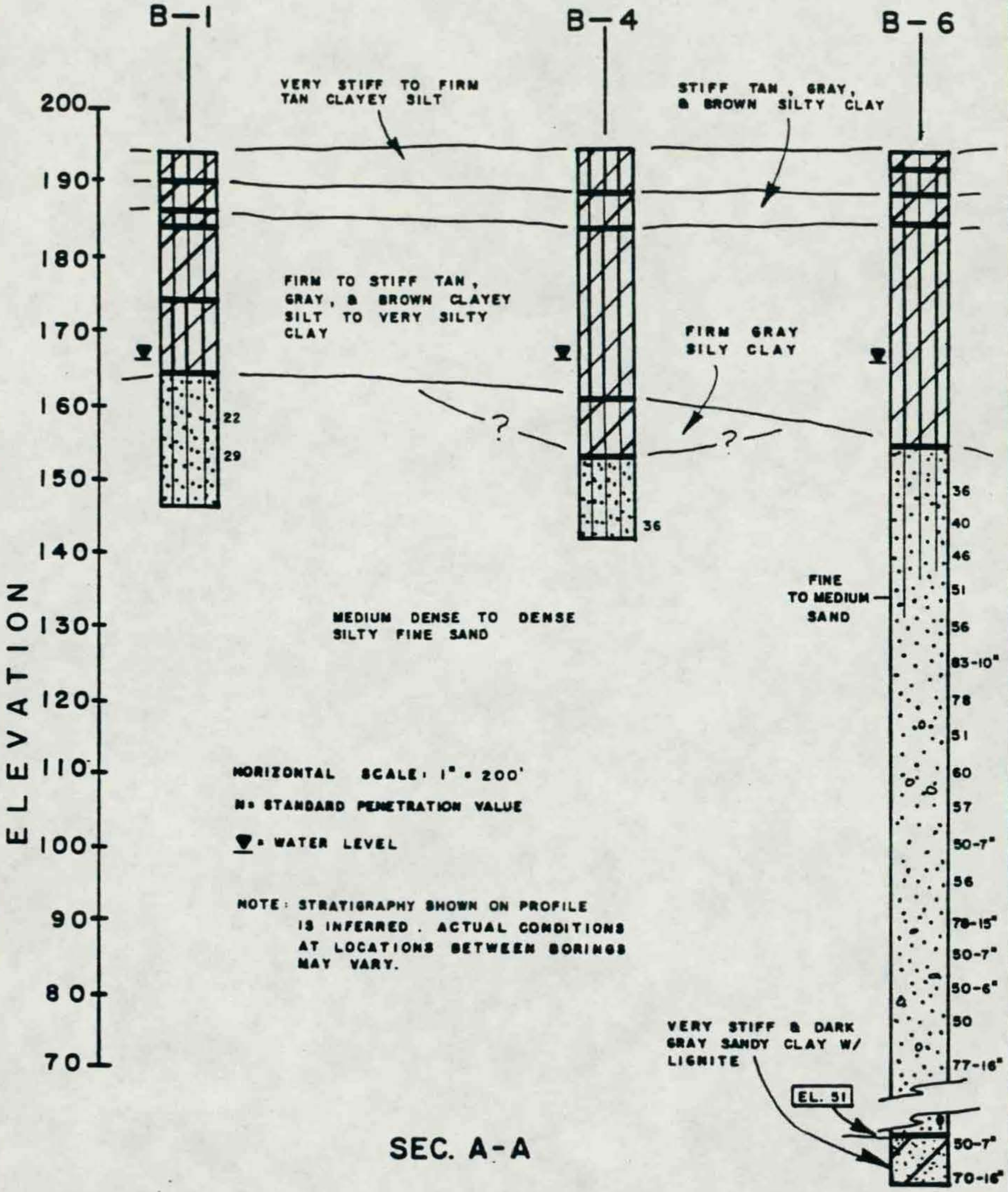
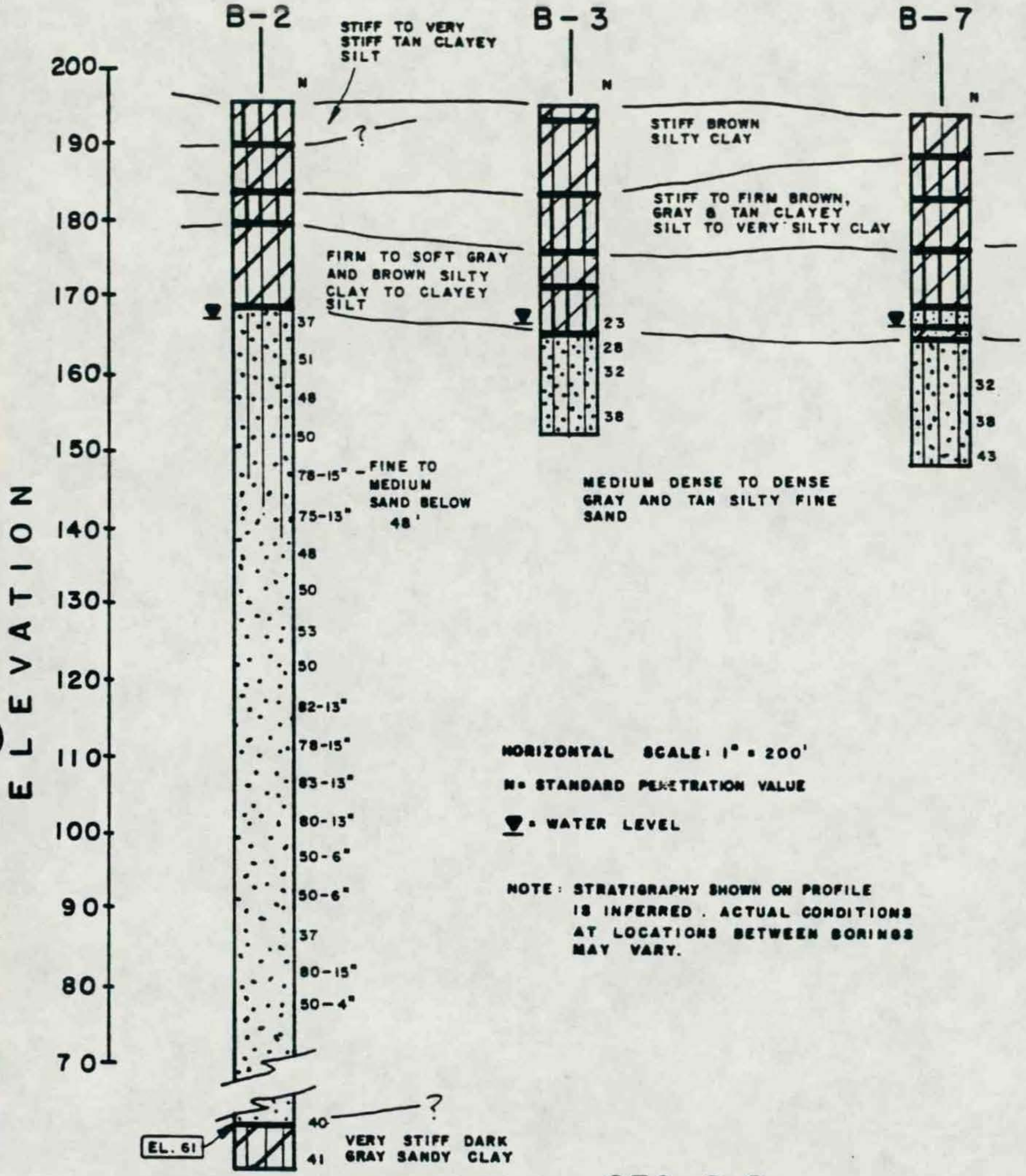

631' MUNICIPAL
(750 gpm)
WEST HELENA
Library
Odd Fellows Cem
West Park
Creek
Helena Country Club
Radio Towers (KFFA)
Polly Dots Cem
100' IRRIGATION
(700-800 gpm)
100' IRRIGATION (700-800 gpm)
100' IRRIGATION
(700-800 gpm)
PACIFIC
MISSOURI
Radio Tower (KCRI)
Freedonia Ch.
135' IRRIGATION
(1000 gpm)
WELL SURVEY

PLATE 19



GENERALIZED SOILS PROFILE

CEDAR CHEMICAL COMPANY
WEST HELENA, ARKANSAS



SEC. B-B

GENERALIZED SOILS PROFILE

CEDAR CHEMICAL COMPANY
WEST HELENA, ARKANSAS

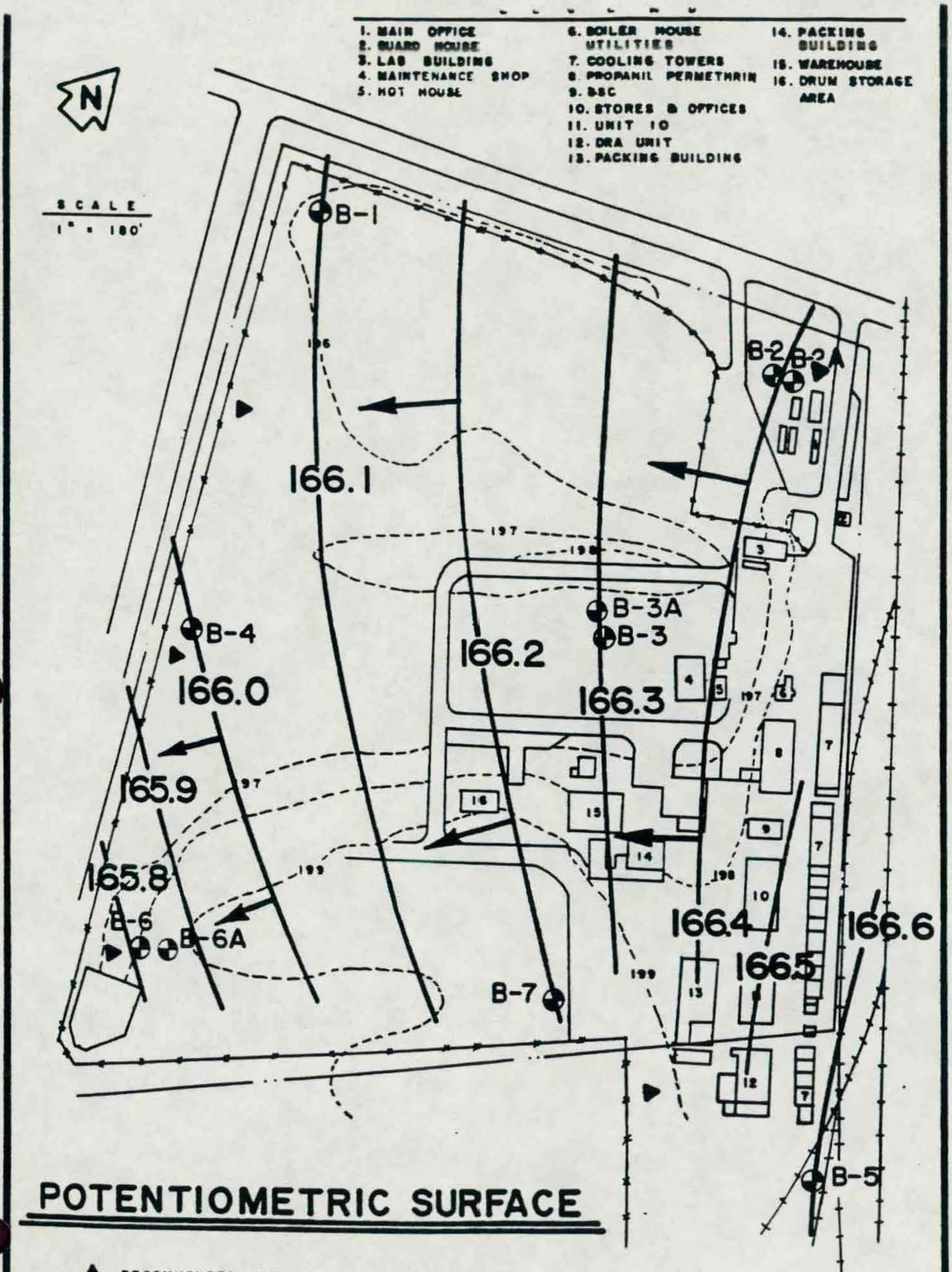

1. MAIN OFFICE
2. GUARD HOUSE
3. LAB BUILDING
4. MAINTENANCE SHOP
5. HOT HOUSE
6. BOILER HOUSE UTILITIES
7. COOLING TOWERS
8. PROPANIL PERMETHRIN
9. BSC
10. STORES & OFFICES
11. UNIT 10
12. DRA UNIT
13. PACKING BUILDING
14. PACKING BUILDING
15. WAREHOUSE
16. DRUM STORAGE AREA
N
SCALE
1" = 180'
B-1
B-2
B-2A
B-3A
B-3
B-4
B-5
B-6
B-6A
B-7
165.8
165.9
166.0
166.1
166.2
166.3
166.4
166.5
166.6
196
197
198
199
POTENTIOMETRIC SURFACE
RECOMMENDED MONITORING WELL LOCATIONS

PLATE 22

Grubbs, Garner
& Hoskyn, Inc.,
Consulting Engineers

10501 Stagecoach Road P.O. Box 5239 Little Rock, AR 72215 501-455-2536 Fax: (501) 455-4137

2- J Miles
3- ADPC&E - MARK Simpson

April 5, 1989

Cedar Chemical Company
P. O. Box 2749
West Helena, Arkansas 72390

Attention: Mr. Joe Porter

MONITORING WELL INSTALLATION
CEDAR CHEMICAL PLANT
WEST HELENA, ARKANSAS

Dear Mr. Porter:

As requested, we have reviewed piezometric data you have been collecting during the past several months and have prepared a series of plates showing the potentiometric surface. These plates are transmitted herewith as Appendix A. We have also reviewed and modified our cost estimate to reflect items listed in your letter dated November 21, 1988.

Listed below are the proposed well depths to conform to recommendations presented in our letter dated September 26, 1988 with modifications that were requested by Mr. Mark Simpson (ADPC&E) and listed in your letter of November 21, 1988:

Well No.	Ground Elev.	Max. Depth To Water, Ft.	Min. Depth To Water, Ft.	Well Depth, Ft.	Screen Length, Ft.	Pipe Length, Ft.
MW-1	194.0	29.0	18.0	40	10	32
MW-2	195.3	30.4	19.0	40	10	32
MW-3	195.2	30.3	19.0	40	10	32
MW-4	194.8	29.8	18.5	80	10	72
MW-4A				50	10	42
MW-4B				30	10	22
MW-4C				10	5	7
MW-5	196.8	31.6	20.8	42	10	34

Proposed well locations are shown on Plate 1, attached. These locations are the same as shown in our letter dated September 26, 1988. In view of the more recent piezometric information, it may be appropriate to move MW-2 north to about the location of B-1.

Our cost estimate has been reviewed and revised to reflect the additional wells at the down-gradient location (MW-4). This revised cost estimate is presented in Appendix B.

If you have any questions about the information presented in or with this letter, please call.

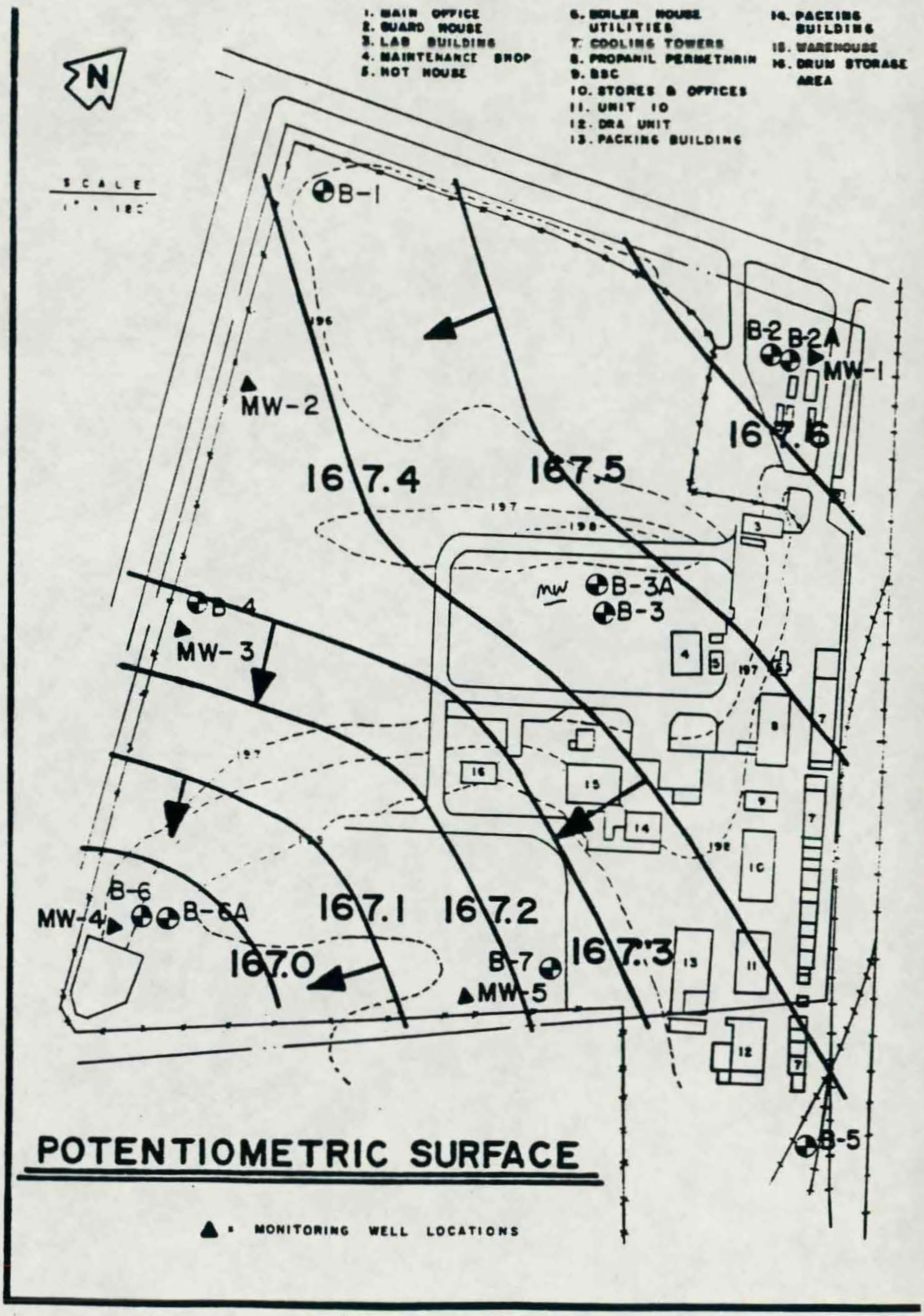
Sincerely,

GRUBBS, GARNER & HOSKYN, INC.

John P. Hoskyn, P.E.
Vice President

JPH/dgf

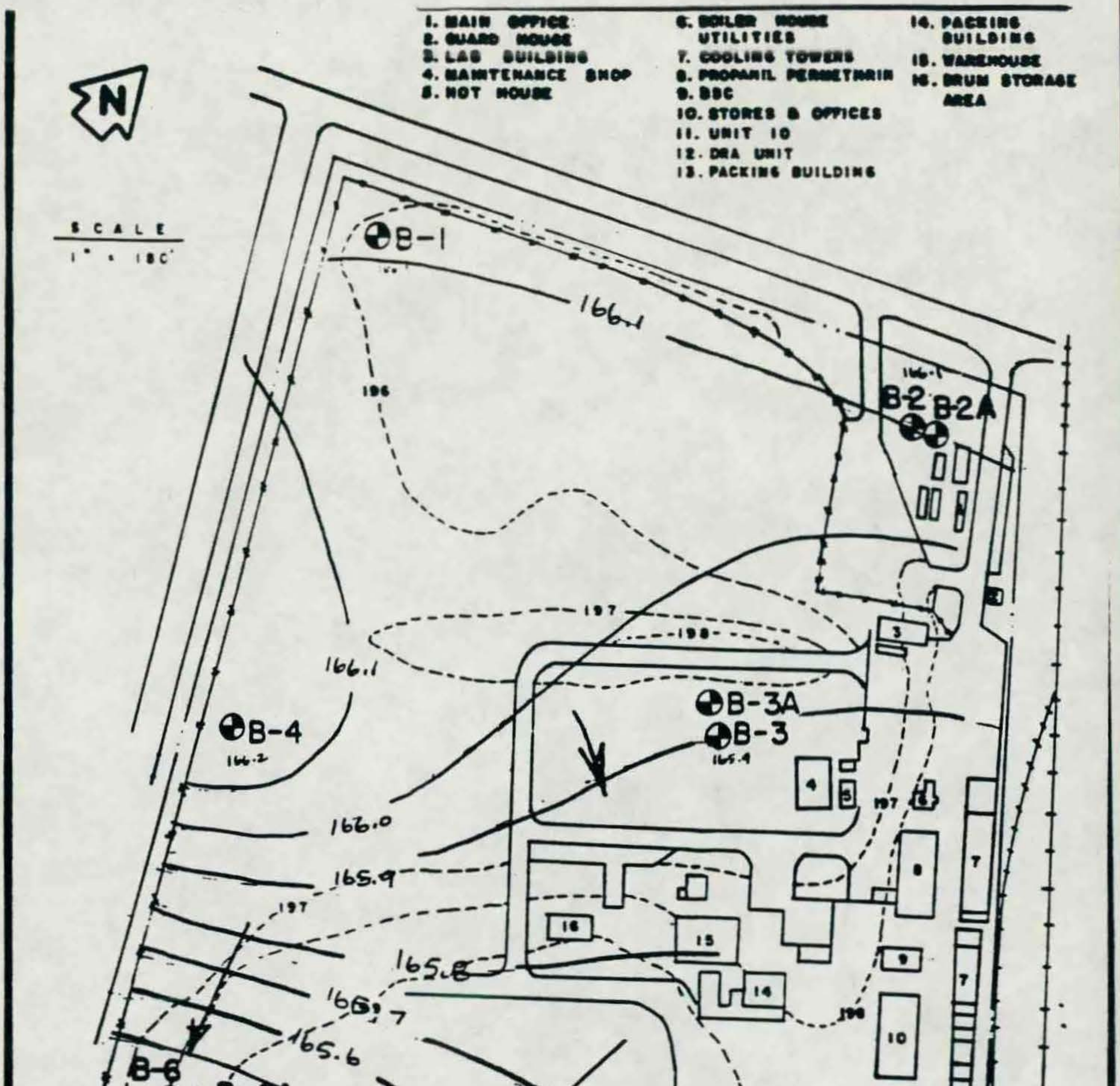
Copies Submitted: Cedar Chemical Company (3)
Attn: Mr. Joe Porter



1. MAIN OFFICE
2. GUARD HOUSE
3. LAB BUILDING
4. MAINTENANCE SHOP
5. HOT HOUSE
6. BOILER HOUSE UTILITIES
7. COOLING TOWERS
8. PROPANIL PERMETHRIN
9. BSC
10. STORES & OFFICES
11. UNIT 10
12. DRA UNIT
13. PACKING BUILDING
14. PACKING BUILDING
15. WAREHOUSE
16. DRUM STORAGE AREA
N
SCALE
B-1
B-2
B-2A
MW-1
MW-2
167.4
167.5
167.6
B-3A
B-3
B-4
MW-3
B-6
B-6A
MW-4
167.1
167.2
167.3
167.0
B-7
MW-5
B-5
POTENTIOMETRIC SURFACE
▲ = MONITORING WELL LOCATIONS

PLATE I

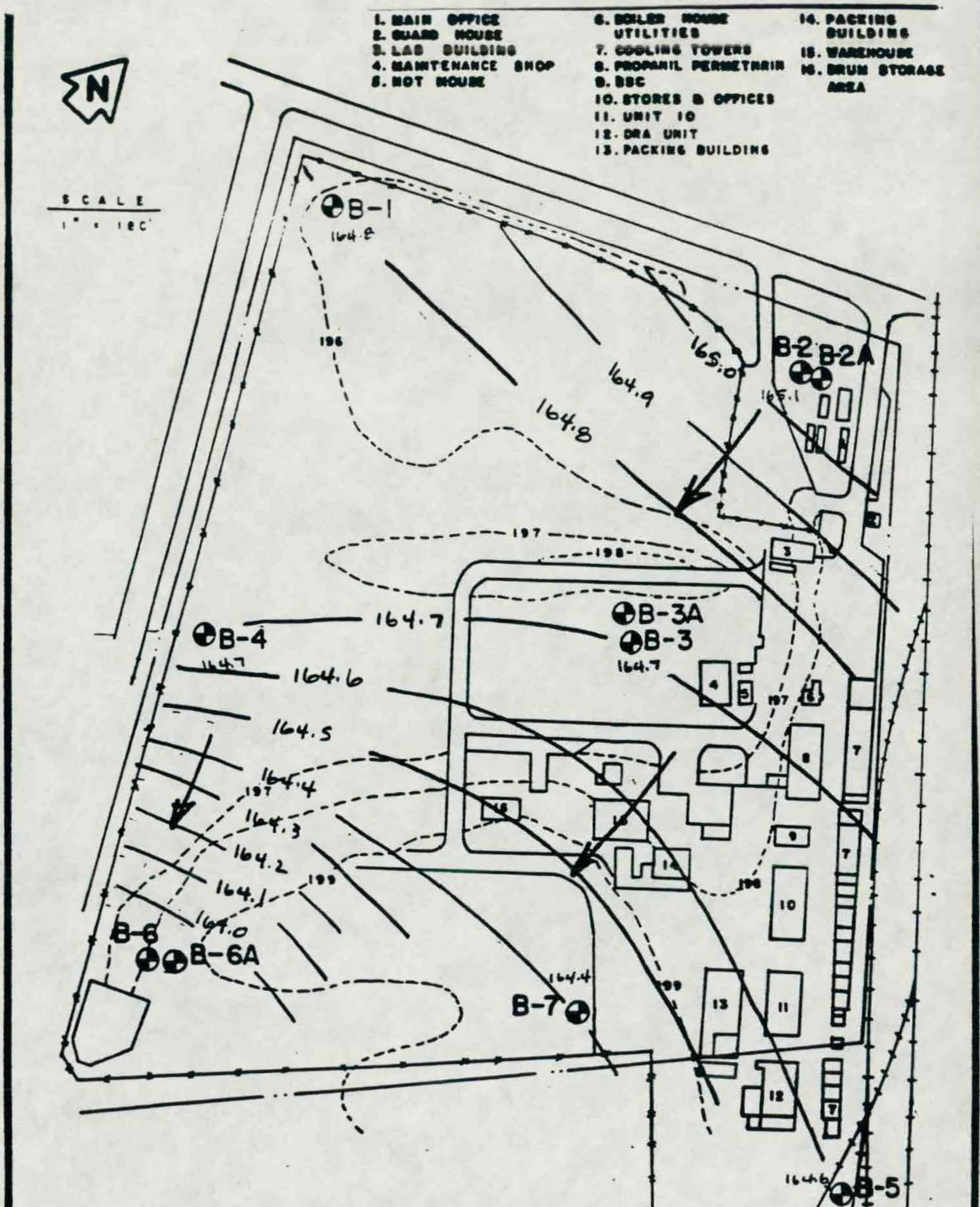
APPENDIX A



CEDAR CHEMICAL COMPANY
WEST HELENA, ARKANSAS

8-9-88

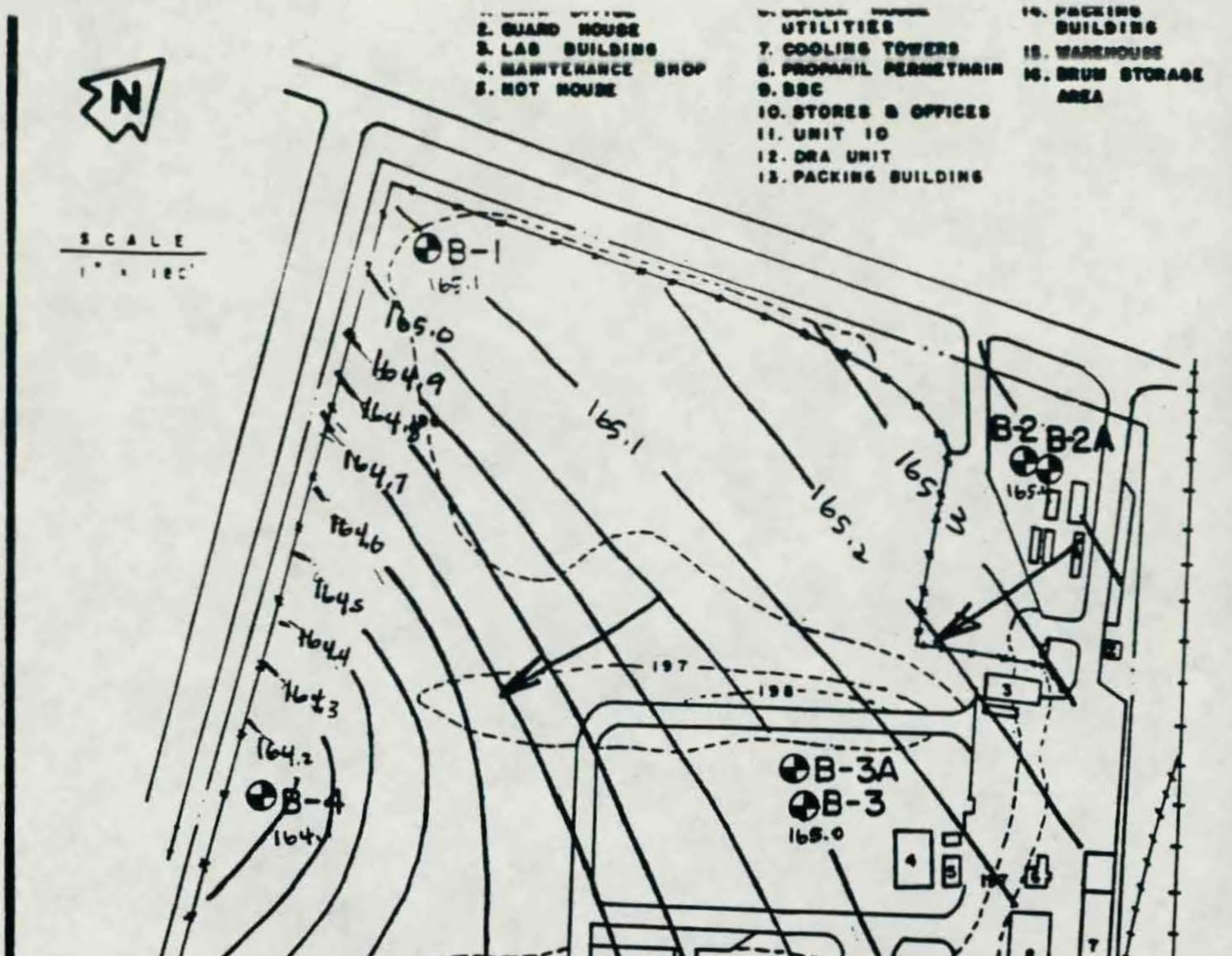
PLATE 2



CEDAR CHEMICAL COMPANY
WEST HELENA, ARKANSAS

8-15-88

PLATE 2



CEDAR CHEMICAL COMPANY
WEST HELENA, ARKANSAS

8-24-88

PLATE 2

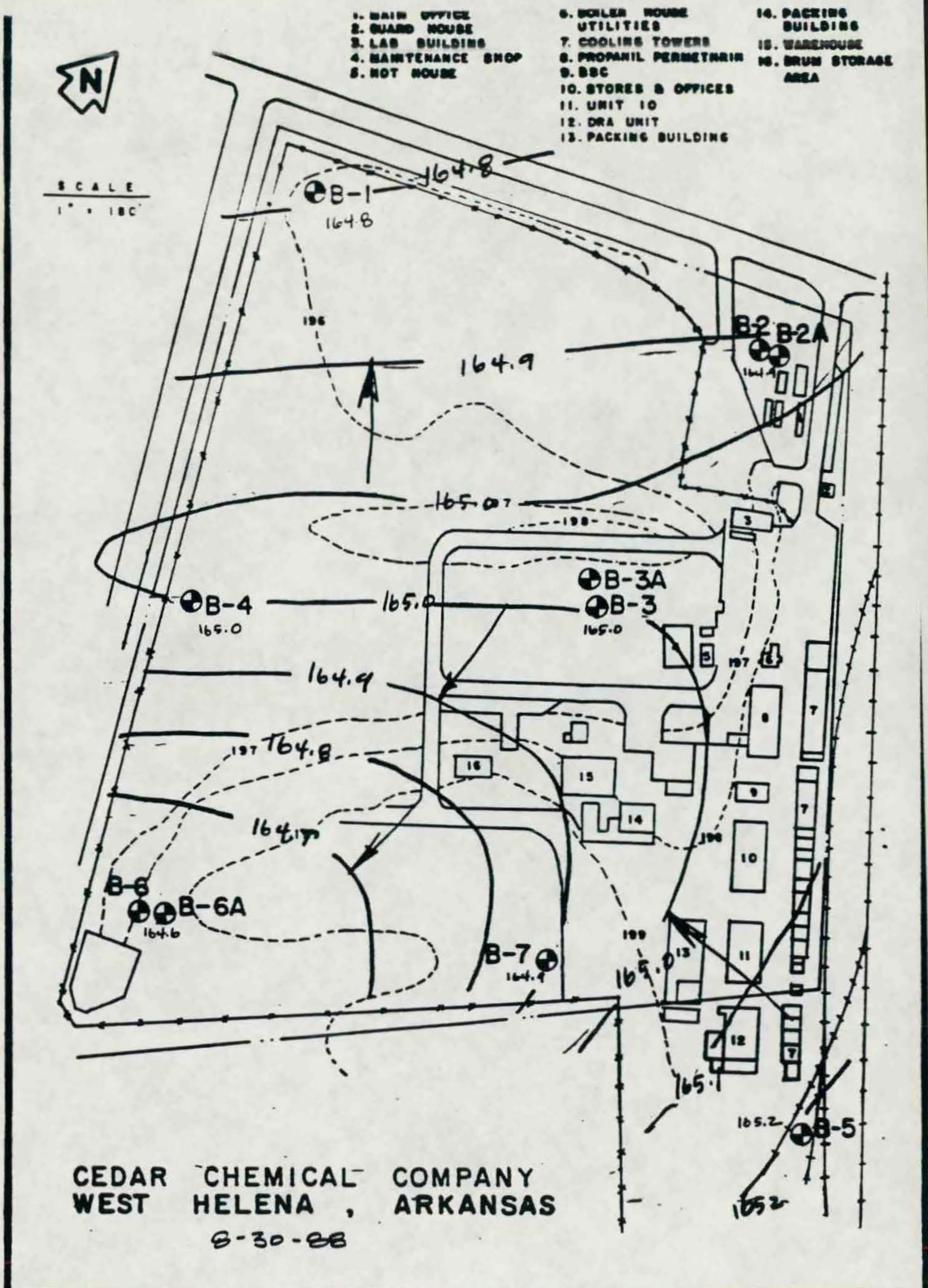
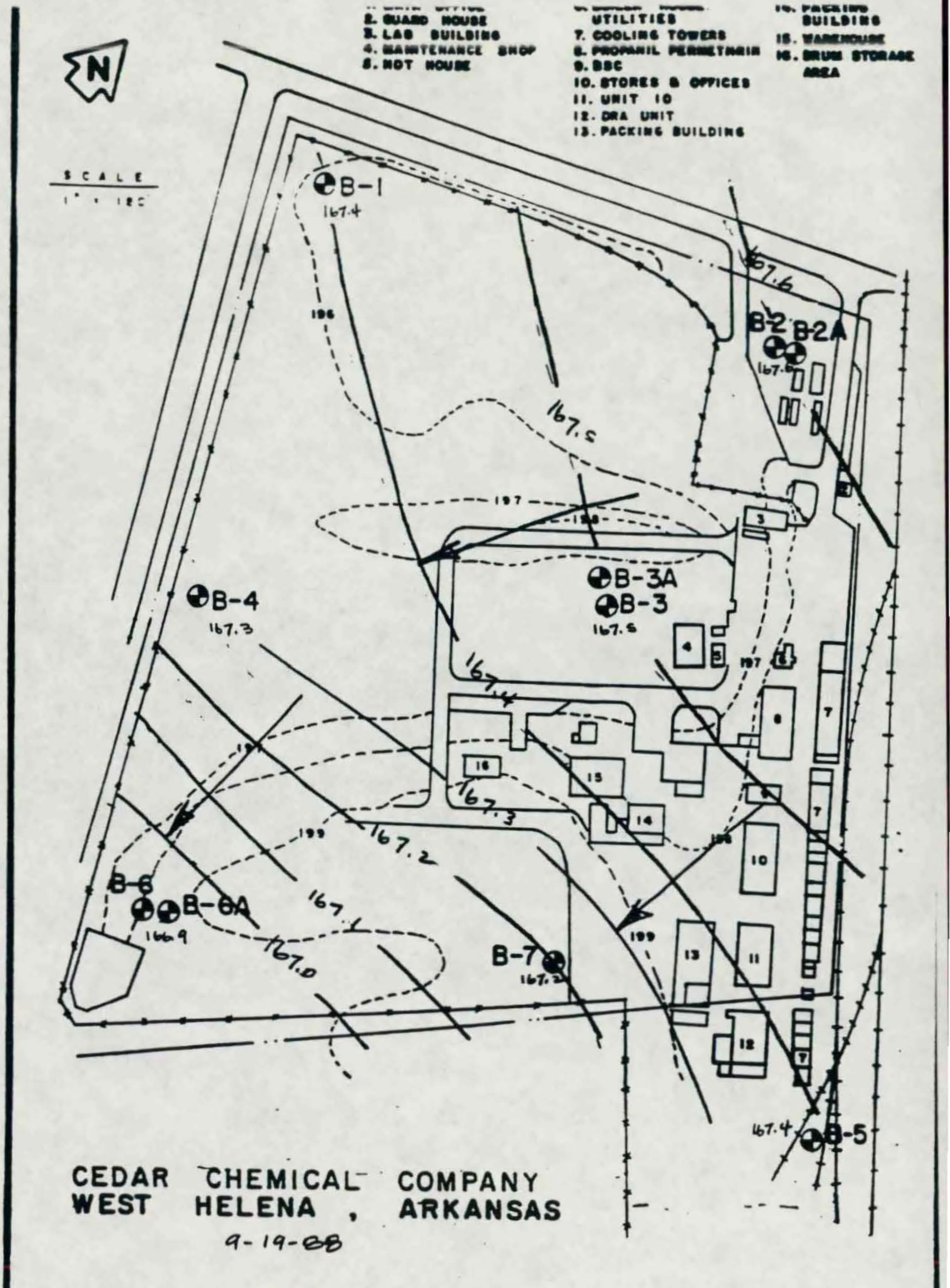

1. MAIN OFFICE
2. GUARD HOUSE
3. LAB BUILDING
4. MAINTENANCE SHOP
5. HOT HOUSE
6. BOILER HOUSE UTILITIES
7. COOLING TOWERS
8. PROPANIL PERMETHRIN
9. BBC
10. STORES & OFFICES
11. UNIT 10
12. DRA UNIT
13. PACKING BUILDING
14. PACKING BUILDING
15. WAREHOUSE
16. DRUM STORAGE AREA
N
SCALE
1" = 180'
B-1
164.8
164.8
B-2
B-2A
164.9
165.0
B-3A
B-3
165.0
B-4
165.0
165.0
164.9
164.8
164.7
B-6
B-6A
164.6
B-7
164.9
165.0
165.1
B-5
165.2
165.2
CEDAR CHEMICAL COMPANY
WEST HELENA, ARKANSAS
8-30-88

PLATE 2



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SCALE
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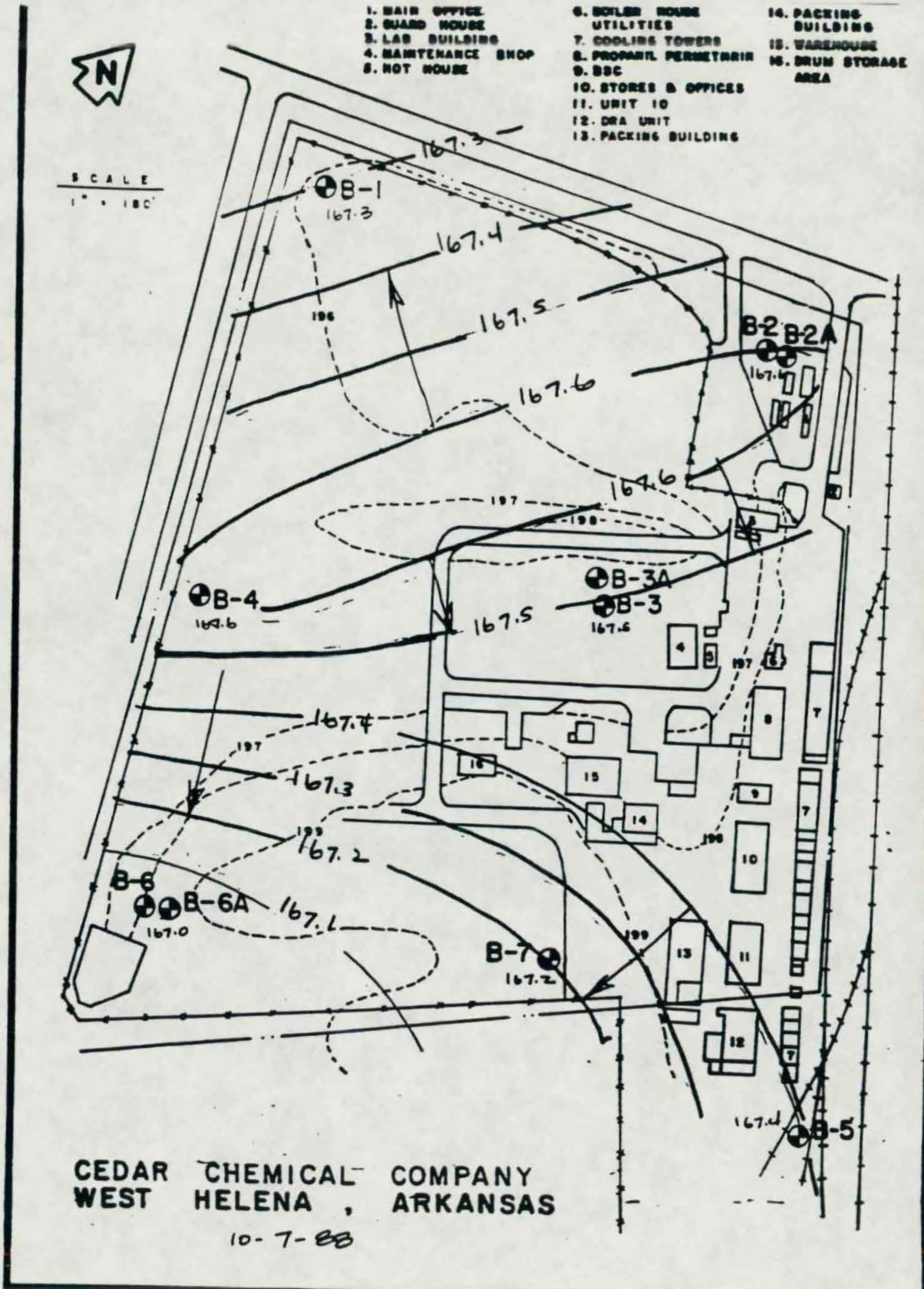
CEDAR CHEMICAL COMPANY
WEST HELENA, ARKANSAS
9-19-88

PLATE 2



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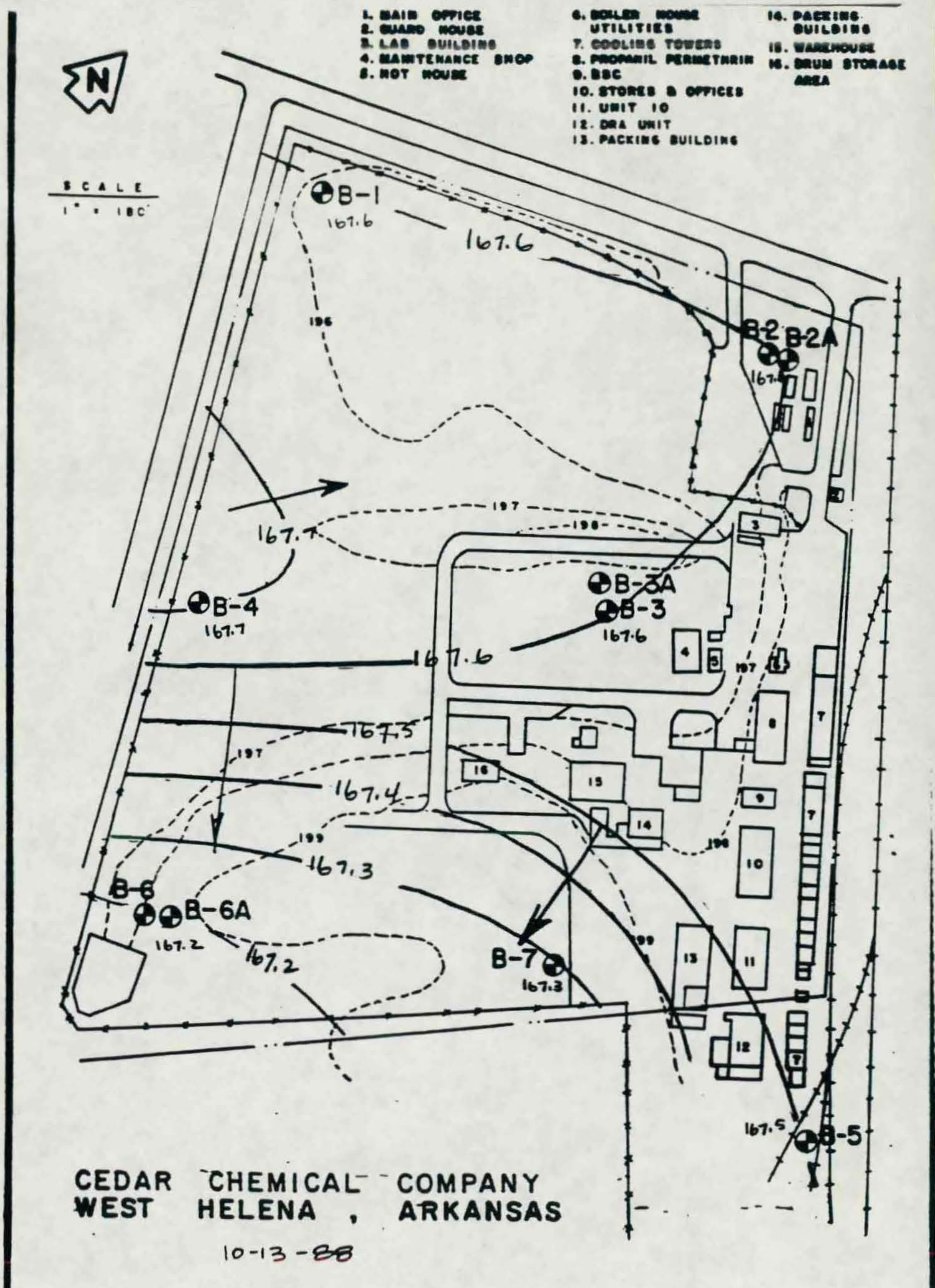
CEDAR CHEMICAL COMPANY
WEST HELENA, ARKANSAS
10-7-88

PLATE 2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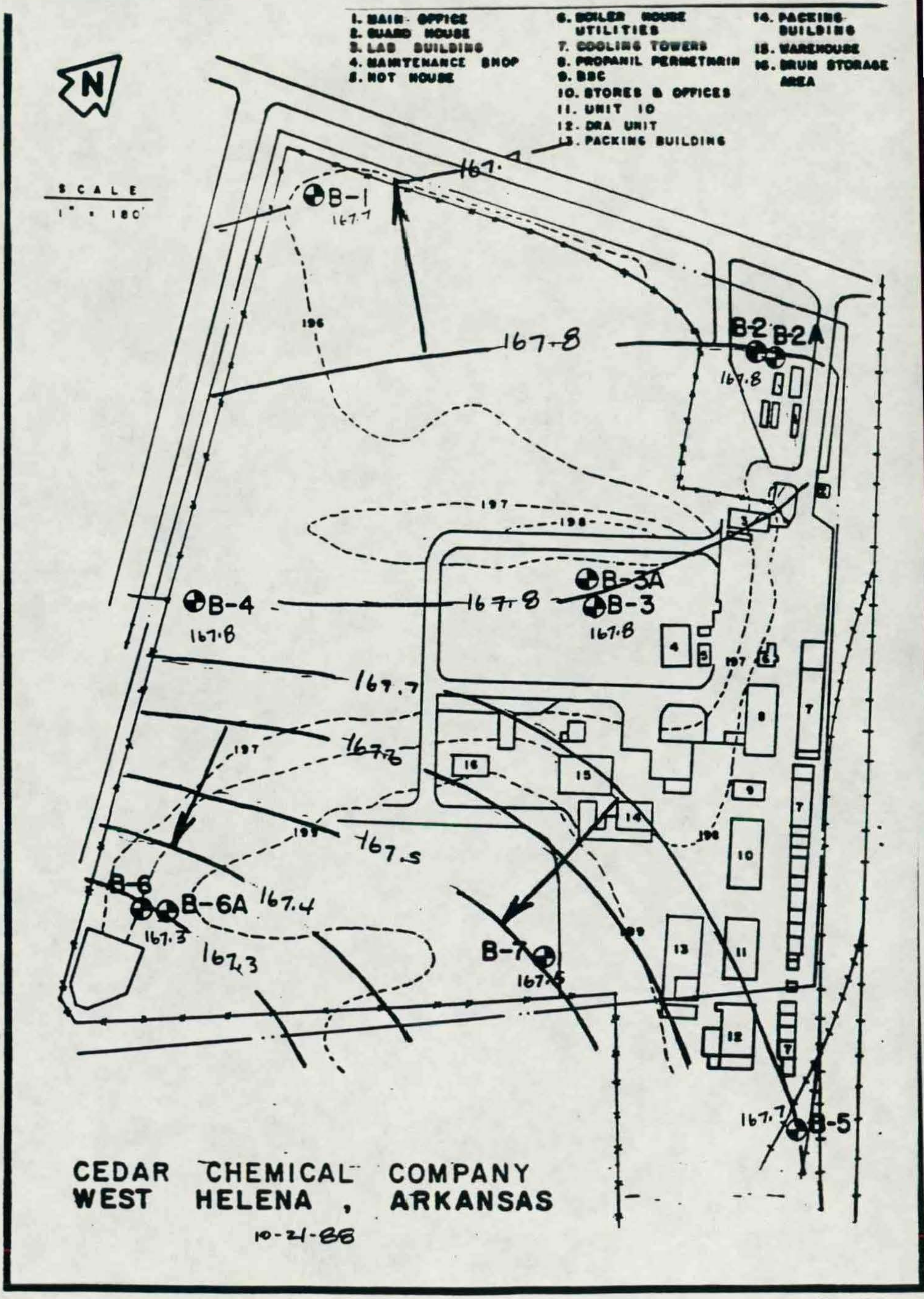
WEST HELENA, ARKANSAS
10-13-88

PLATE 2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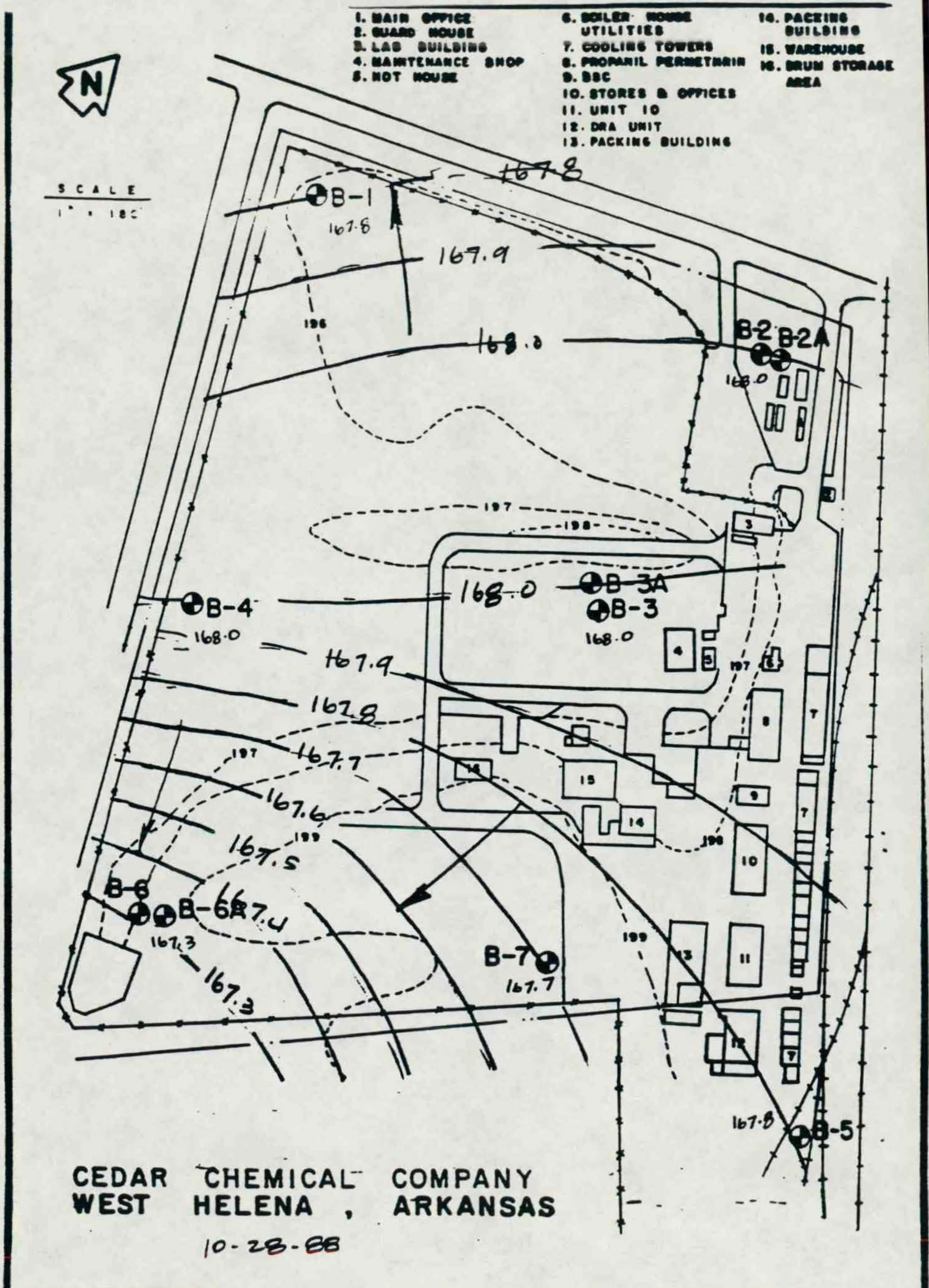
CEDAR CHEMICAL COMPANY
WEST HELENA, ARKANSAS
10-21-88

PLATE 2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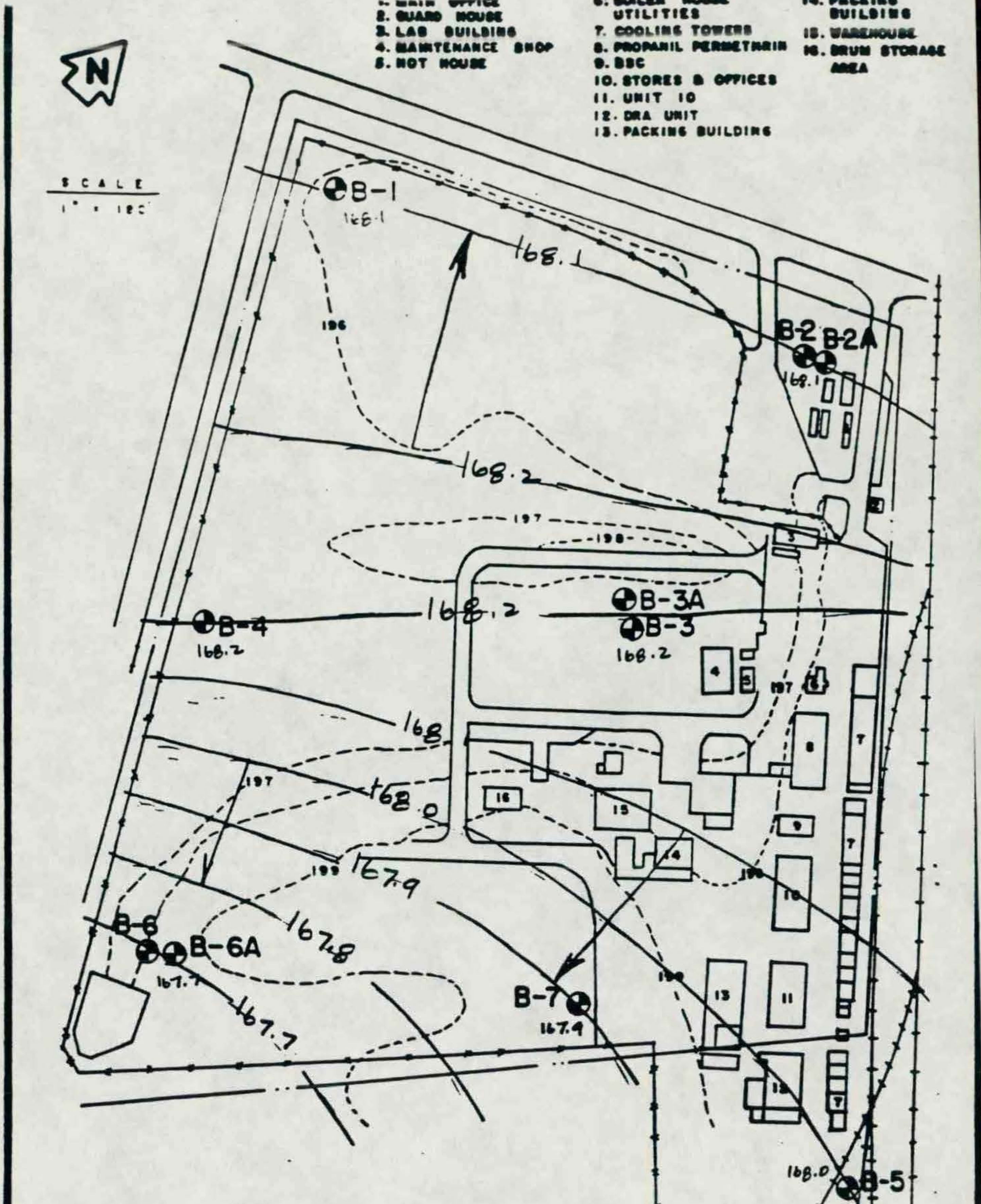
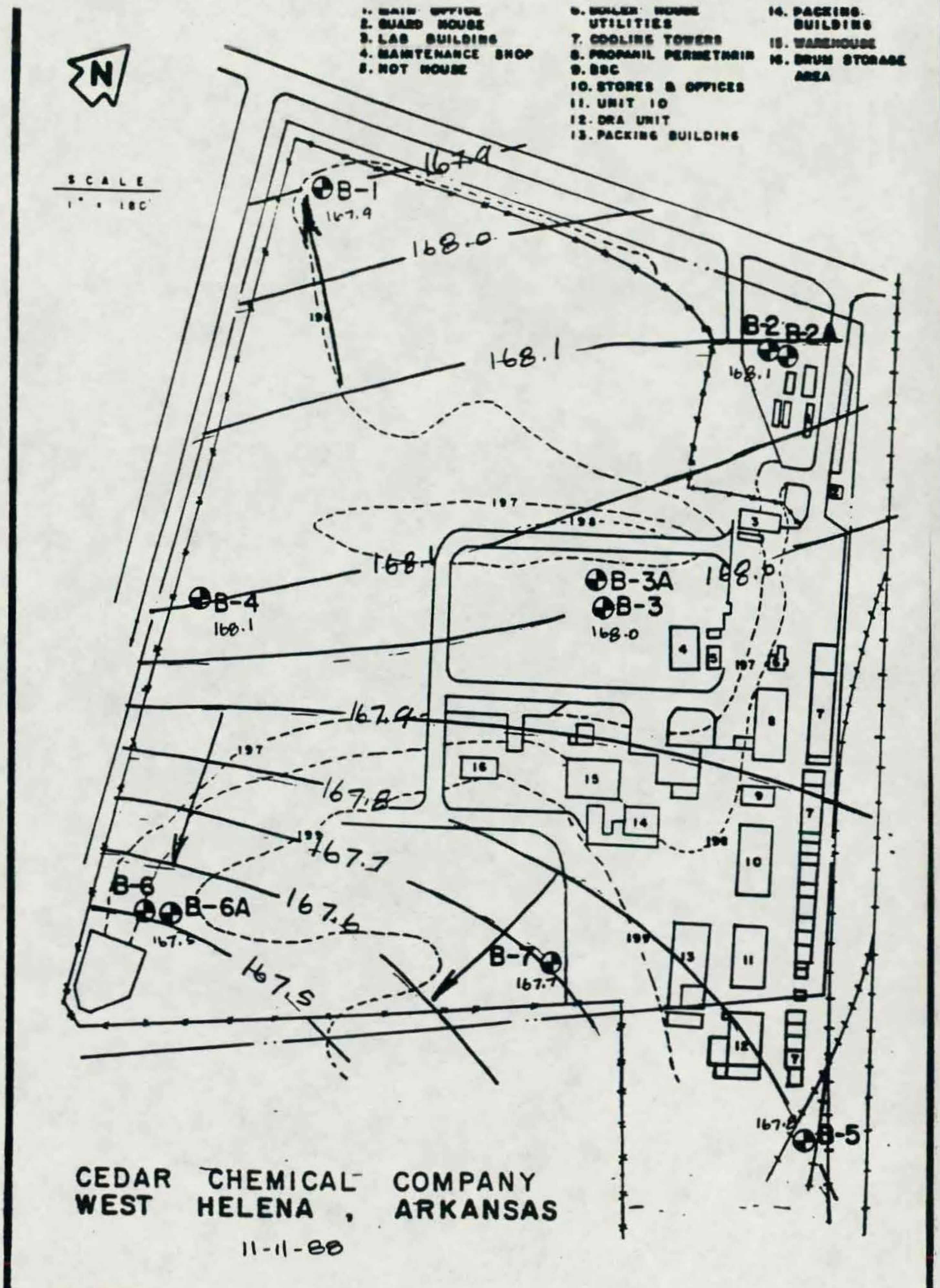
WEST HELENA, ARKANSAS
10-28-88

PLATE 2



CEDAR CHEMICAL COMPANY
WEST HELENA , ARKANSAS
11-4-88

PLATE 2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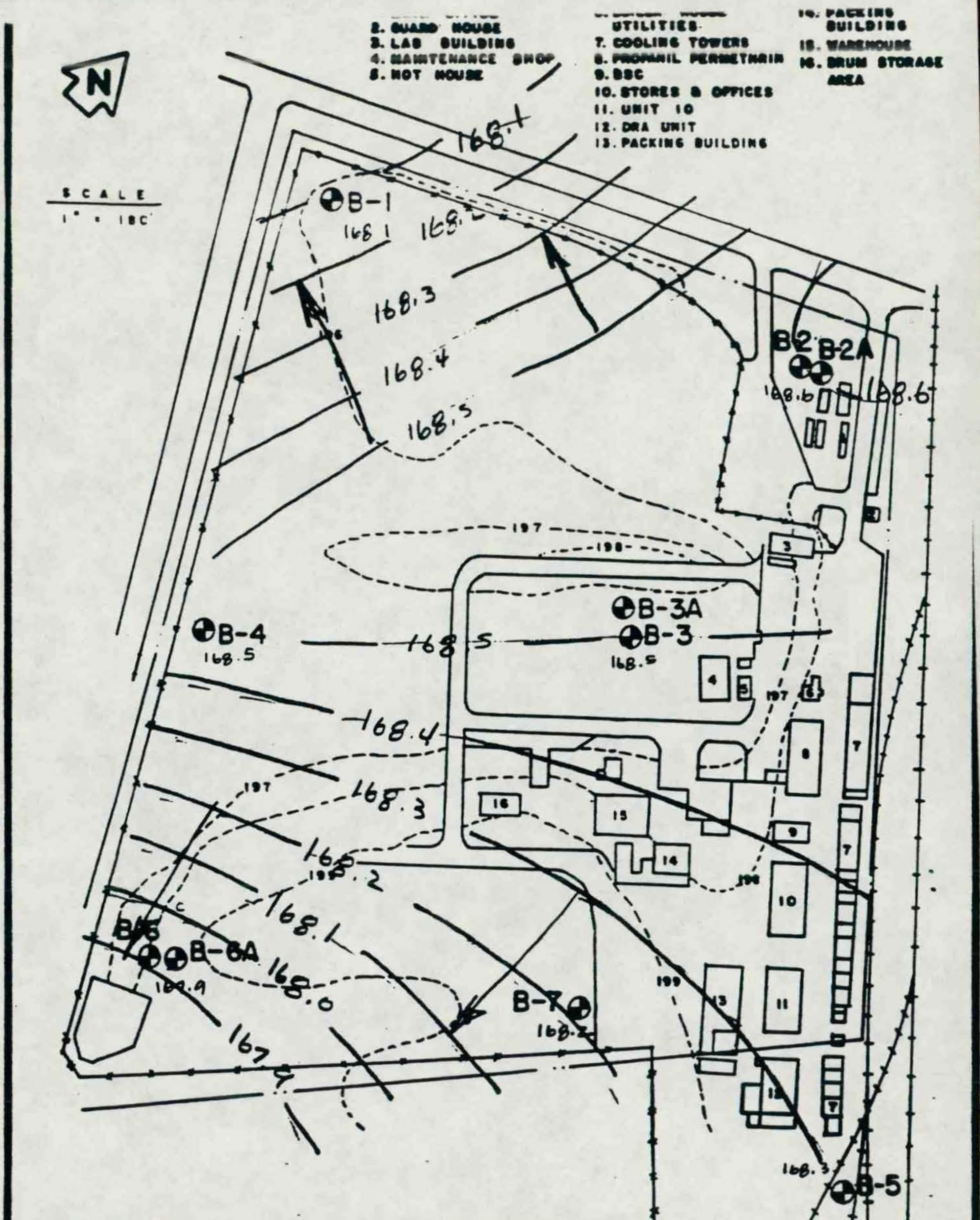
WEST HELENA, ARKANSAS
11-11-88

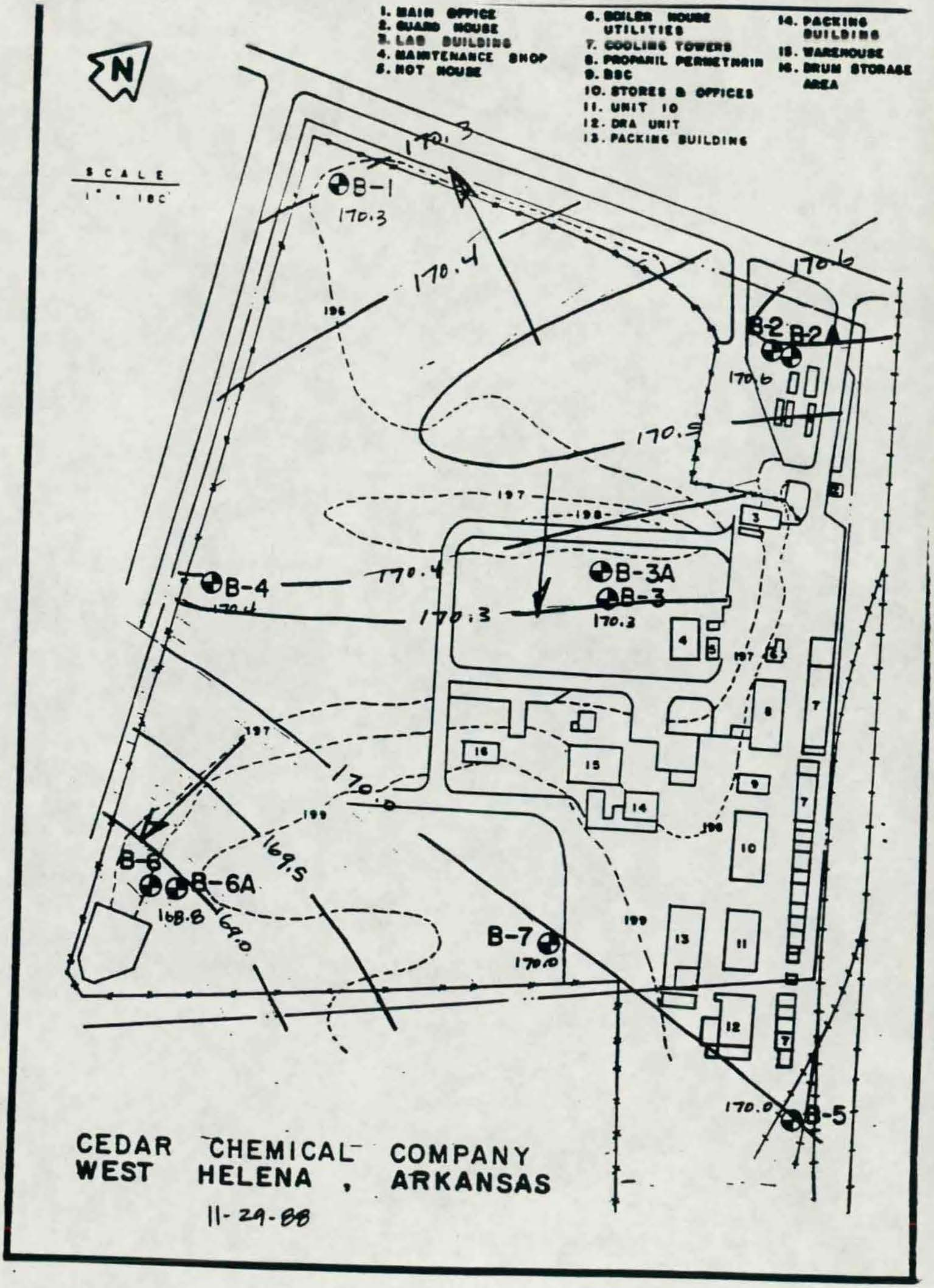
PLATE 2



CEDAR CHEMICAL COMPANY
WEST HELENA, ARKANSAS

11-18-88

PLATE 2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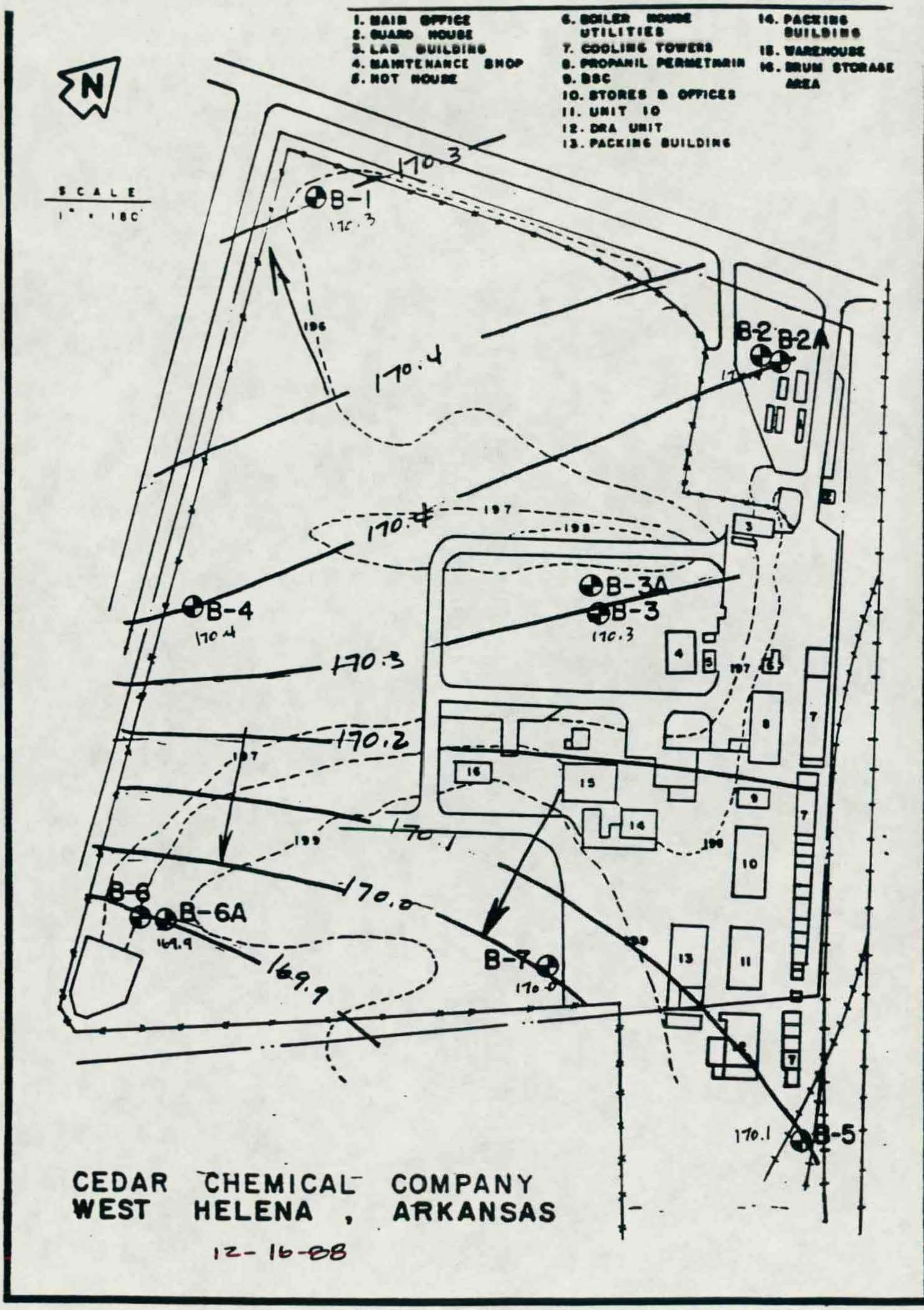
WEST HELENA, ARKANSAS
11-29-88

PLATE 2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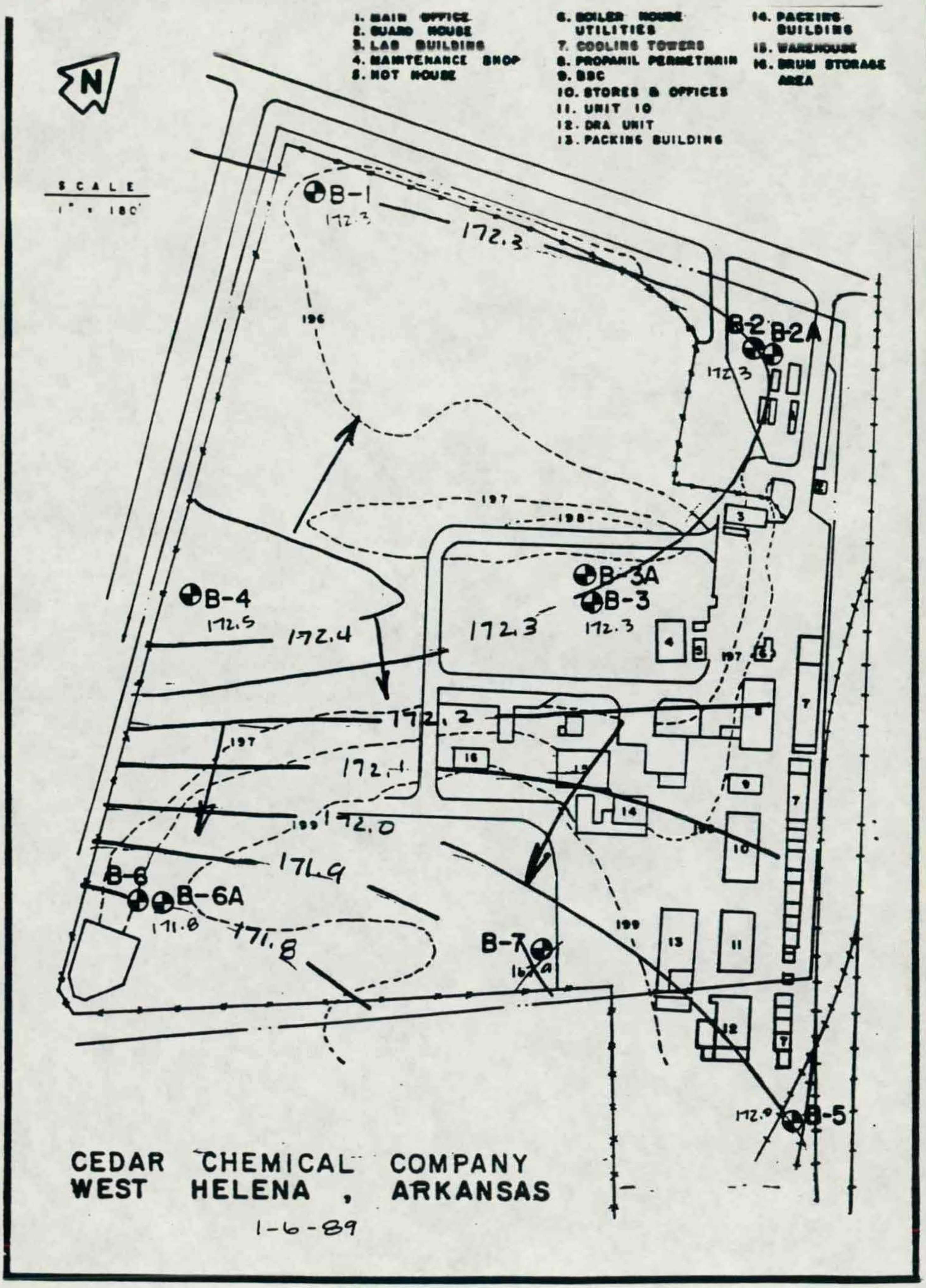
CEDAR CHEMICAL COMPANY
WEST HELENA, ARKANSAS
12-16-88

PLATE 2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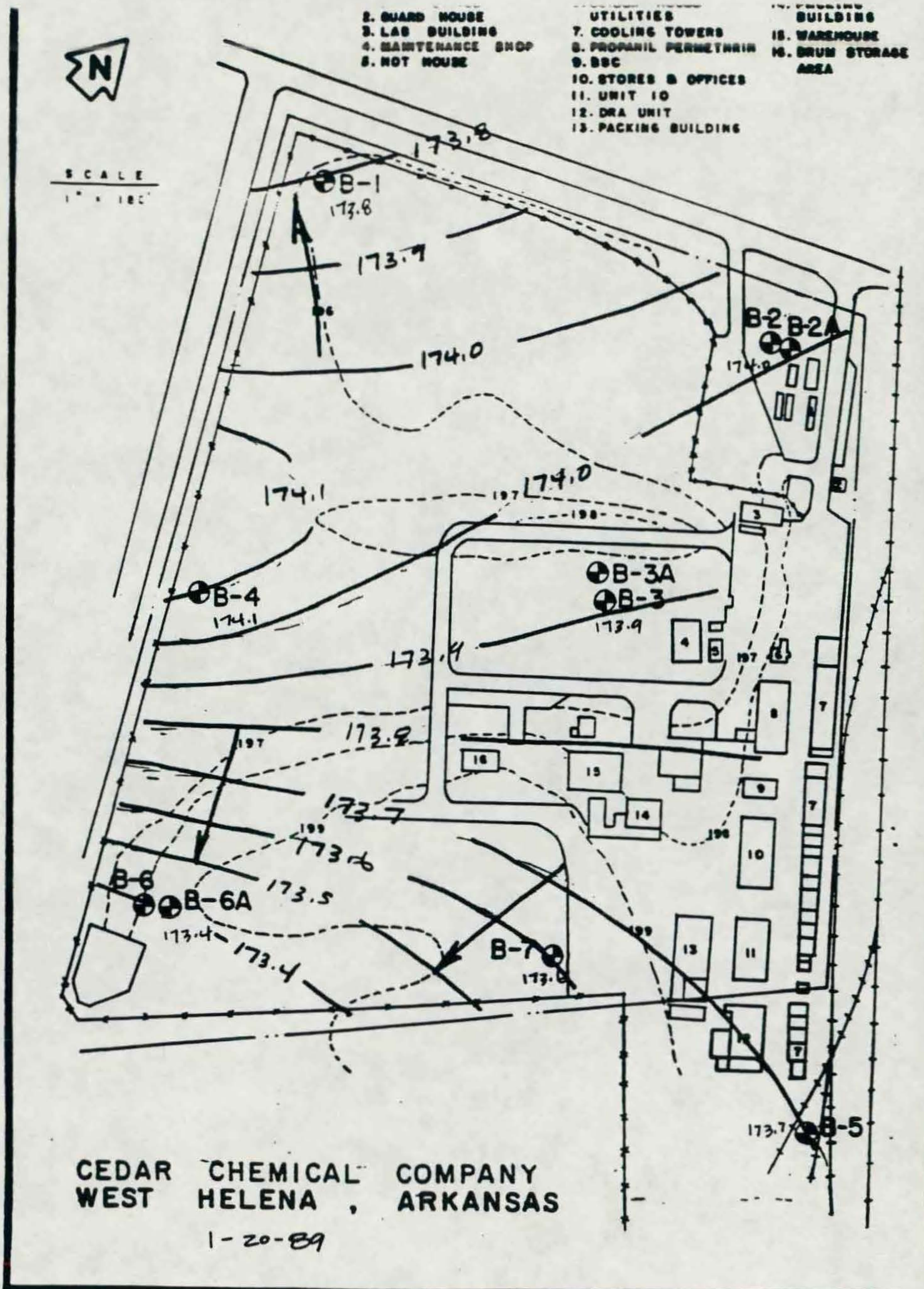
CEDAR CHEMICAL COMPANY
WEST HELENA, ARKANSAS
1-6-89

PLATE 2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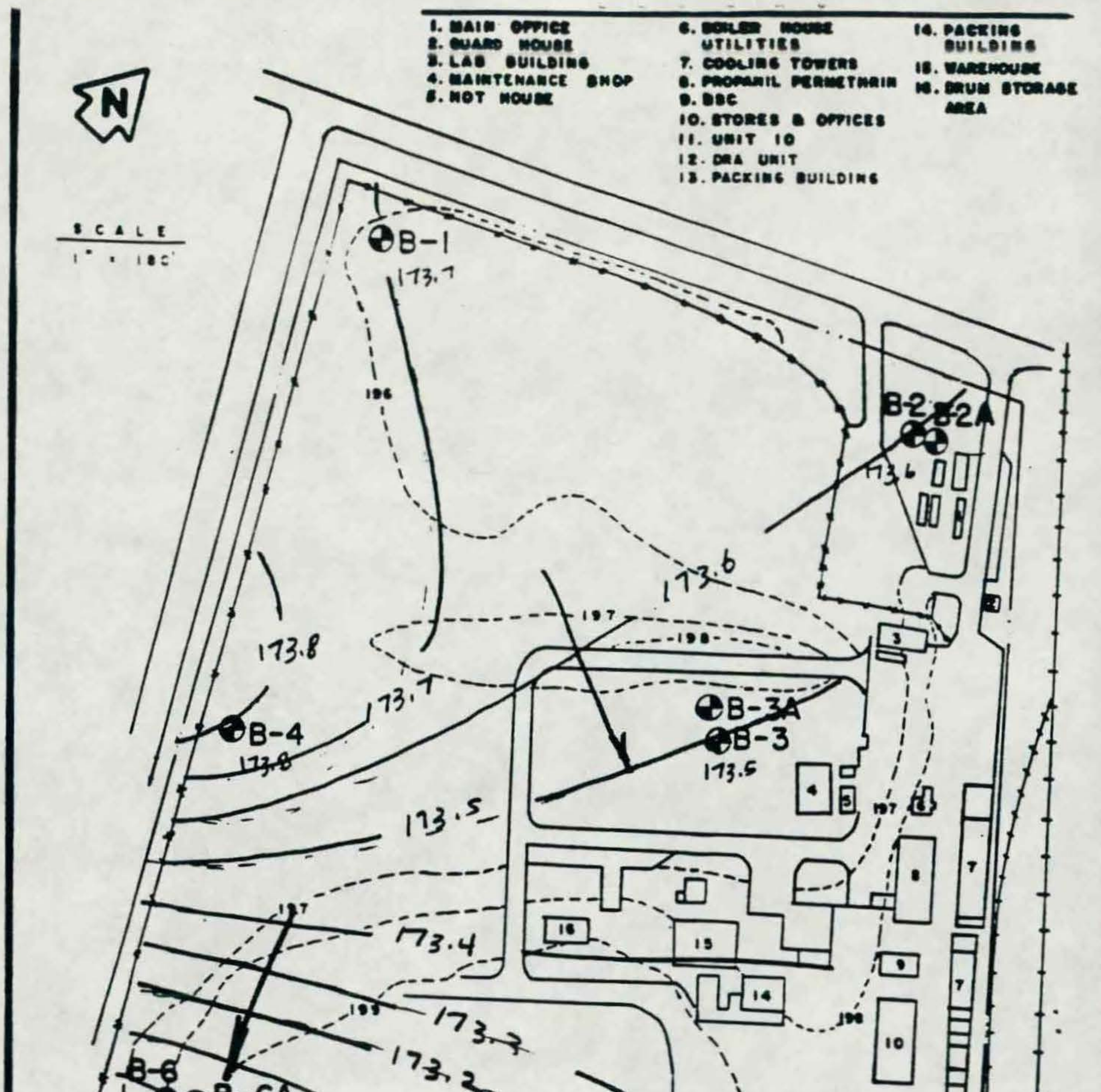
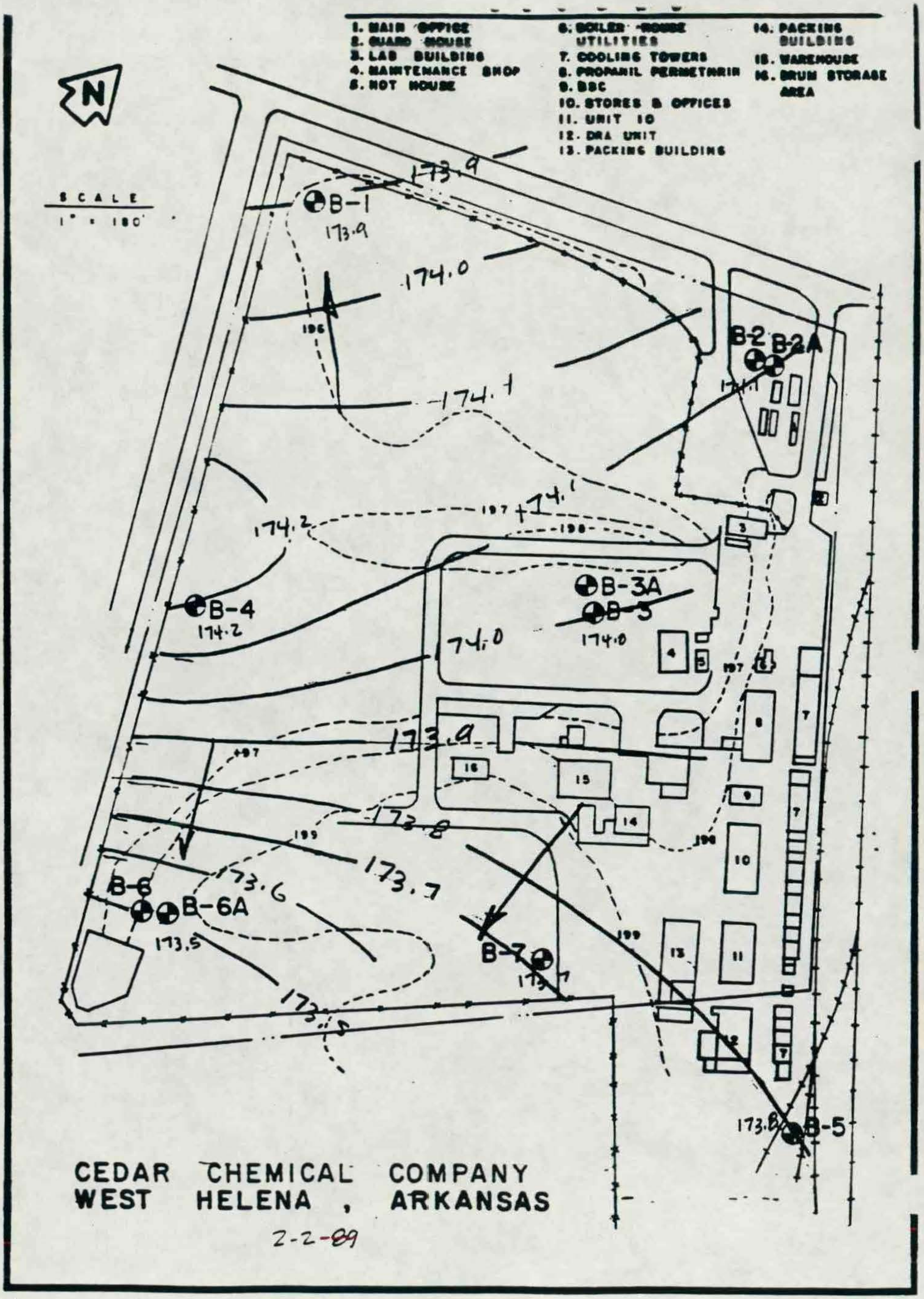
CEDAR CHEMICAL COMPANY
WEST HELENA, ARKANSAS
1-20-89

PLATE 2



CEDAR CHEMICAL COMPANY
WEST HELENA, ARKANSAS

1-27-89



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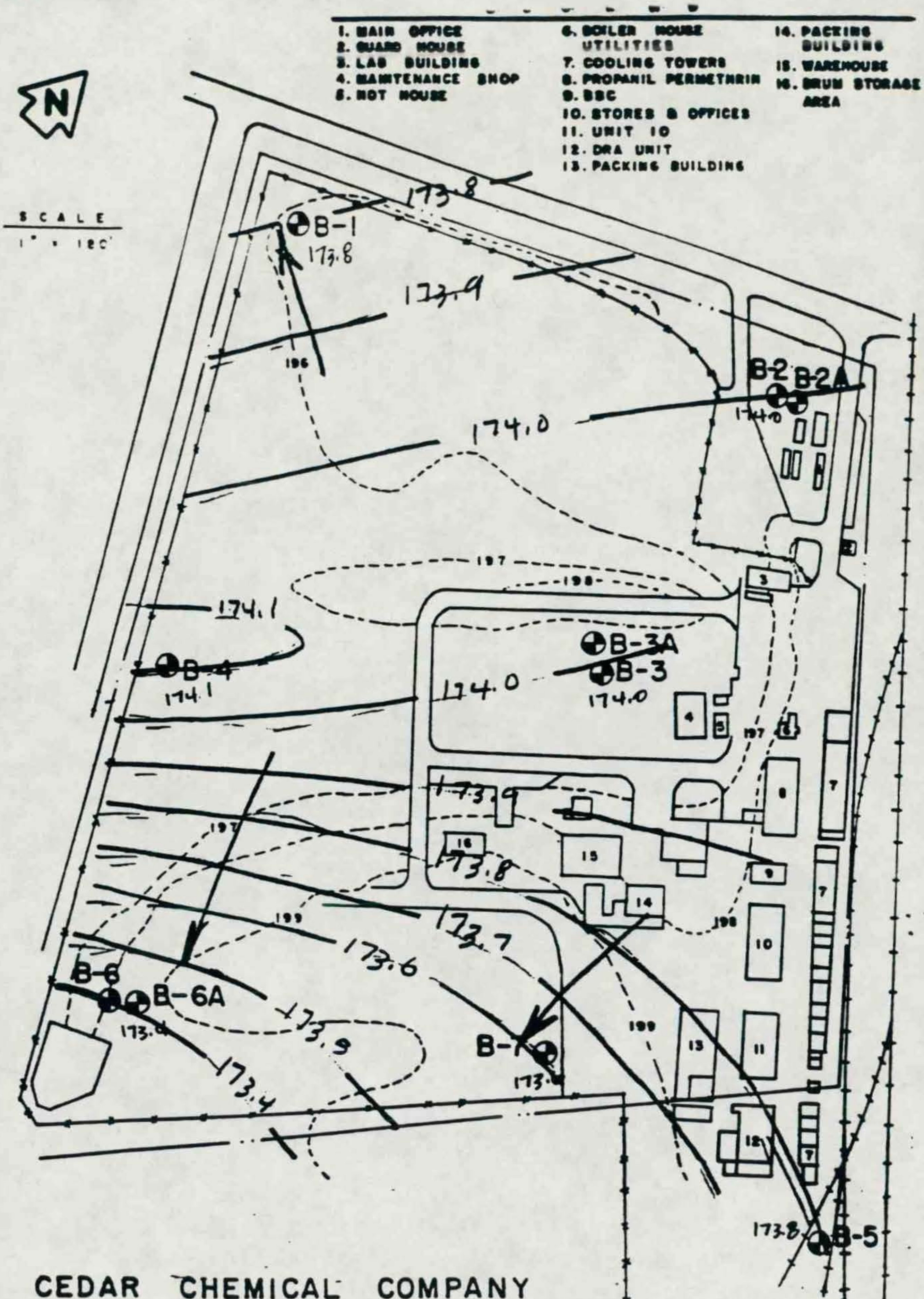
CEDAR CHEMICAL COMPANY
WEST HELENA, ARKANSAS
2-2-89

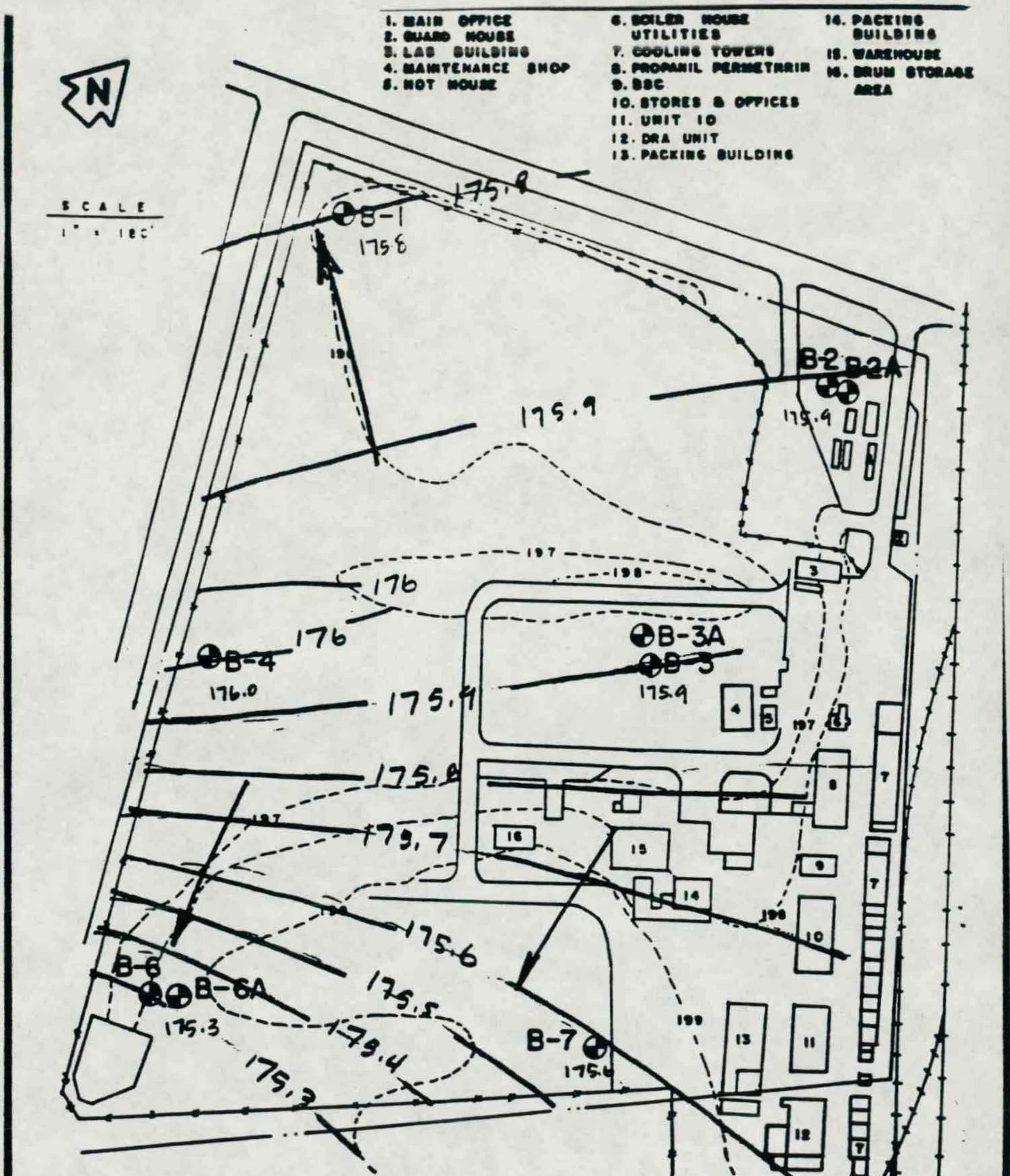
PLATE 2



CEDAR CHEMICAL COMPANY
WEST HELENA, ARKANSAS

2-10-89

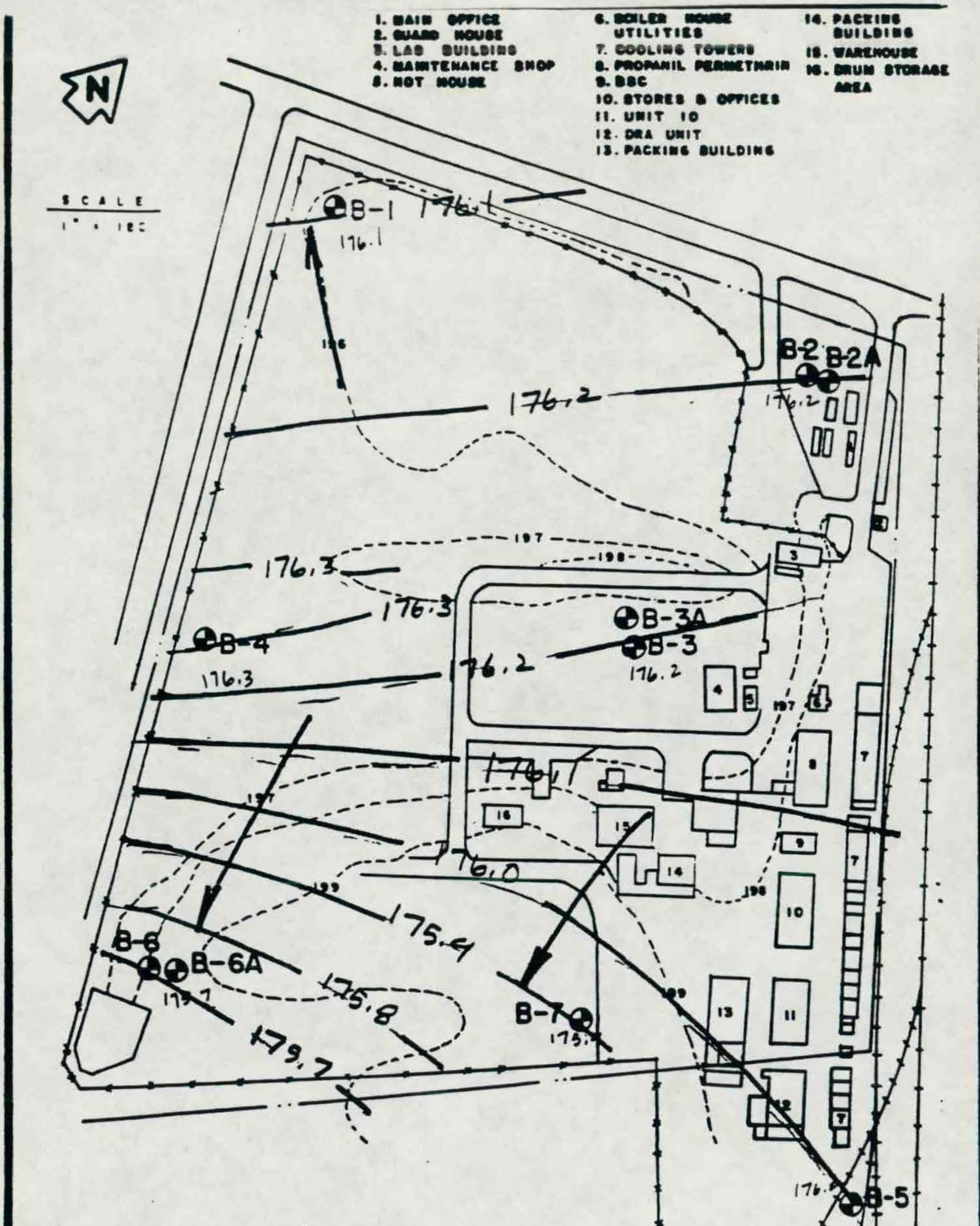
PLATE 2



CEDAR CHEMICAL COMPANY
WEST HELENA, ARKANSAS

2-24-89

PLATE 2



CEDAR CHEMICAL COMPANY
WEST HELENA, ARKANSAS

3-3-89

PLATE 2

MONITORING WELL CONSTRUCTION INFORMATION

Cedar Chemical Company possesses no documentation concerning the monitoring well design of the onsite wells.

APPENDIX C
CURRENT NPDES PERMIT
AND PAST ENFORCEMENT ACTIONS

CURRENT NPDES PERMIT

NPDES

STATE OF ARKANSAS
DEPARTMENT OF POLLUTION CONTROL AND ECOLOGY

8001 NATIONAL DRIVE, P.O. BOX 9583
LITTLE ROCK, ARKANSAS 72209
PHONE:(501)562-7444
FAX:(501)562-4632

CERTIFIED MAIL: RETURN RECEIPT REQUESTED (P4 336 47 159)

Rec'd Oct 1, 1990

Mr. John H. Miles, Jr.
Cedar Chemical Corporation
P.O. Box 2749
West Helena, AR 72390

Re: NPDES Permit No. AR0036412

Dear Mr. Miles:

This letter constitutes notice of the Department's final permit decision and a copy of the final permit is enclosed, along with a response to comments received during the public comment period.

The applicant, persons submitting written comments during the public comment period, and all other persons entitled to do so, may request an adjudicatory hearing and Commission review on whether the decision of the Department should be revised or modified. Such a request shall be in the form and manner required by Section 4, Part III of Regulation No. 8.

Sincerely,

Chuck C. Bennett
Chief, Water Division

CB:mlc

Enclosure
cc: U.S. EPA

RESPONSE TO COMMENTS

DRAFT NPDES PERMIT

This is our response to the comments received on the subject draft NPDES permit in accordance with our regulations.

Permit No. : AR0036412

Permittee : Cedar Chemical Corporation
P.O. Box 2749
West Helena, AR 72390

Draft Permit Public Notice Date : August 26, 1990

Permit Engineer : Michael Core

ISSUE NO. 1 - In a letter dated September 11, 1990 the permittee requested clarification in the definition of the sampling location for outfall 002. The request was to define the sampling location as, " following the final treatment unit as it enters the pipeline to the Mississippi River."

RESPONSE NO. 1 - The permit has been changed accordingly.

ISSUE NO. 2 - The permittee has requested that the dilution series be changed to 100%, 10%, 1%, 0.1%, 0.003% instead of 100%, 30%, 10%, 1%, and 0.003%.

RESPONSE NO. 2 - The Agency concurs and the dilution series will be changed in the final permit.

ISSUE and RESPONSE NO. 3 - The Agency pursuant to re-evaluation and concurrence from the U.S. Fish and Wildlife Service has added acute biomonitoring requirements to outfall 001. The discharges from this outfall consist of boiler and cooling tower blowdown, condensate, and stormwater runoff. It should be noted however that the discharge of boiler and cooling tower blowdown and condensate is normally to the treatment system and to outfall 002. Biomonitoring was included to assess the potential toxicity of these discharges prior to their entering the White River National Wildlife Refuge.

Permit number: AR0036412

AUTHORIZATION TO DISCHARGE UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM AND THE ARKANSAS WATER AND AIR POLLUTION CONTROL ACT

In accordance with the provisions of the Arkansas Water and Air Pollution Control Act (Act 472 of 1949, as amended, Ark. Code Ann. 8-4-101 et seq.), and the Clean Water Act (33 U.S.C. 1251 et seq.),

Cedar Chemical Corporation
24th Floor
5100 Poplar Avenue
Memphis, TN 38137

is authorized to discharge from a facility located at

Cedar Chemical Corporation
P.O. Box 2749
West Helena, AR 72390

Section 14, Township 2 South, Range 4 East near West Helena in Phillips County.

Outfall 001 - Latitude : 34° 32' 15" North
Longitude: 90° 39' 19" West

Outfall 002 - Latitude : 34° 29' 43" North
Longitude: 90° 35' 46" West

to receiving waters named:

Outfall 001 - Industrial Park Ditch in Segment 4A of the White River Basin.

Outfall 002 - Mississippi River in Segment 6B.

in accordance with effluent limitations, monitoring requirements, and other conditions set forth in Parts I, II (Version 2), III, and IV (Version 2) hereof.

This permit shall become effective on November 1, 1990

This permit and the authorization to discharge shall expire at midnight, October 31, 1995.

Signed this 28th day of September 1990

Chuck C. Bennett
Chief, Water Division
Arkansas Department of Pollution Control and Ecology

PART I
PERMIT REQUIREMENTS

SECTION A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS: OUTFALL 001 - boiler blowdown, condensate, cooling tower blowdown, and stormwater runoff.

During the period beginning on effective date and lasting through date of expiration, the permittee is authorized to discharge from outfall serial number 001. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations				Monitoring Requirements	
	Mass (lbs/day)		Other Units (specify)			
	Daily Avg	Daily Max	Daily Avg	Daily Max	Measurement Frequency	Sample Type
Flow *	N/A	N/A	N/A	N/A	Once/week	Instantaneous
Chemical Oxygen Demand	N/A	N/A	N/A	100 mg/l	Once/Week**	Grab
Oil and Grease	N/A	N/A	N/A	15 mg/l	Once/Week**	Grab
Total Pesticides	N/A	N/A	N/A	Report	Once/Week**	Grab
Total Chromium	N/A	N/A	N/A	0.4 mg/l	Once/Week**	Grab
Total Lead	N/A	N/A	N/A	0.4 mg/l	Once/Week**	Grab
Biomonitoring***	N/A	N/A	N/A	N/A	Once/Quarter**	Grab

* Flow must be monitored and reported.
** When discharging.
*** See Part III, Other Conditions.

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored once per week by grab sample.**

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): at the Outfall 001.

PART I
PERMIT REQUIREMENTS

SECTION A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS: OUTFALL 002 - treated process, washdown, scrubber and sanitary wastewater.

During the period beginning on effective date and lasting through date of expiration, the permittee is authorized to discharge from outfall serial number 002. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations				Monitoring Requirements	
	Mass (lbs/day)		Other Units (specify)			
	Daily Avg	Daily Max	Daily Avg	Daily Max	Measurement Frequency	Sample Type
Flow *	N/A	N/A	N/A	N/A	Continuous	Record
Biochemical Oxygen Demand (5-day)	68	259	N/A	N/A	Once/Week	24 HR. Composite
Chemical Oxygen Demand	315	455	N/A	N/A	Once/Week	24 HR. Composite
Total Suspended Solids	79	214	N/A	N/A	Once/Week	24 HR. Composite
Ammonia - Nitrogen	10	20	N/A	N/A	Once/Week	24 HR. Composite
Phenol	0.03	0.1	N/A	N/A	Once/Week	24 HR. Composite
Total Chromium	0.12	0.24	N/A	N/A	Once/Week	24 HR. Composite
Total Lead	0.12	0.24	N/A	N/A	Once/Week	24 HR. Composite
Total Pesticides	0.07	0.40	N/A	N/A	Once/Week	24 HR. Composite
Biomonitoring**	N/A	N/A	N/A	N/A	Once/Quarter	24 HR. Composite

* Flow must be monitored and reported.
** See Part III, Other Conditions.

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored three times per week by grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): at the Outfall 002, following the final treatment unit as it enters the disposal pipeline to the Mississippi River.

SECTION B. SCHEDULE OF COMPLIANCE

The permittee shall achieve compliance with the effluent limitations specified for discharges in accordance with the following schedule:

Compliance is required on the effective date.

PART II — STANDARD CONDITIONS
SECTION A — GENERAL CONDITIONS

1. **Duty to Comply**

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the federal Clean Water Act and the Arkansas Water and Air Pollution Control Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application. Any values reported in the required Discharge Monitoring Report which are in excess of an effluent limitation specified in Part I.A. shall constitute evidence of violation of such effluent limitation and of this permit.

2. **Penalties for Violations of Permit Conditions**

The Arkansas Water and Air Pollution Control Act provides that any person who violates any provisions of a permit issued under the Act shall be guilty of a misdemeanor and upon conviction thereof shall be subject to imprisonment for not more than one (1) year, or a fine of not more than ten thousand dollars ($10,000) or by both such fine and imprisonment for each day of such violation. Any person who violates any provision of a permit issued under the Act may also be subject to civil penalty in such amount as the court shall find appropriate, not to exceed five thousand dollars ($5,000) for each day of such violation. The fact that any such violation may constitute a misdemeanor shall not be a bar to the maintenance of such civil action.

3. **Permit Action**

This permit may be modified, revoked and reissued, or terminated for cause including, but not limited to, the following:

a. Violation of any terms or conditions of this permit; or
b. Obtaining this permit by misrepresentation or failure to disclose fully all relevant facts; or
c. A change in any conditions that requires either a temporary or permanent reduction or elimination of the authorized discharge; or
d. A determination that the permitted activity endangers human health or the environment and can only be regulated to acceptable levels by permit modification or termination.
e. Failure of the permittee to comply with the provisions of ADPCE Regulation No. 9 (Permit fees) as required by condition II.A. 10 herein.

The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

4. **Toxic Pollutants**

Notwithstanding Part II.A.3., if any toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is promulgated under Regulation No. 2, as amended (regulation establishing water quality standards for surface waters of the State of Arkansas) or Section 307(a) of the Clean Water Act for a toxic pollutant which is present in the discharge and that standard or prohibition is more stringent than any limitation on the pollutant in this permit, this permit shall be modified or revoked and reissued to conform to the toxic effluent standards or prohibition and the permittee so notified.

The permittee shall comply with effluent standards or prohibitions established under Regulation No. 2 (Arkansas Water Quality Standards), as amended, or Section 307(a) of the Clean Water Act for toxic pollutants within the time provided in the regulations that establish those standards or prohibitions, even if the permit has not yet been modified to incorporate the requirement.

5. **Civil and Criminal Liability**

Except as provided in permit conditions on "Bypassing" (Part II.B.4.a.), and "Upsets" (Part II.B.5.b.), nothing in this permit shall be construed to relieve the permittee from civil penalties for noncompliance. Any false or materially misleading representation or concealment of information required to be reported by the provisions of this permit or applicable state and federal statutes or regulations which defeats the regulatory purposes of the permit may subject the permittee to criminal enforcement pursuant to the Arkansas Water and Air Pollution Control Act (Act 472 of 1949, as amended).

6. **Oil and Hazardous Substance Liability**

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under Section 311 of the Clean Water Act.

7. **State Laws**

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State law or regulation under authority preserved by Section 510 of the Clean Water Act.

8. **Property Rights**

The issuance of this permit does not convey any property rights of any sort, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations.

9. **Severability**

The provisions of this permit are severable. If any provisions of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application for such provisions to other circumstances, and the remainder of this permit, shall not be affected thereby.

10. **Permit Fees**

The permittee shall comply with all applicable permit fee requirements for wastewater discharge permits as described in ADPCE Regulation No. 9 (Regulation for the Fee System for Environmental Permits). Failure to promptly remit all required fees shall be grounds for the Director to initiate action to terminate this permit under the provisions of 40 CFR 122.64 and 124.5(d), as adopted in ADPCE Regulation No. 6, and the provisions of ADPCE Regulation No. 8.

SECTION B — OPERATION AND MAINTENANCE OF POLLUTION CONTROLS

1. **Proper Operation and Maintenance**

a. The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit.
b. The permittee shall provide an adequate operating staff which is duly qualified to carry out operation, maintenance and testing functions required to insure compliance with the conditions of this permit.

2. **Need to Halt or Reduce Not a Defense**

It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit. Upon reduction, loss, or failure of the treatment facility, the permittee shall, to the extent necessary to maintain compliance with its permit, control production or discharges or both until the facility is restored or alternative method of treatment is provided. This requirement applies, for example when the primary source of power for the treatment facility is reduced, is lost, or alternate power supply fails.

3. **Duty to Mitigate**

The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has reasonable likelihood of adversely affecting human health or the environment.

4. **Bypass of Treatment Facilities**

a. Bypass not exceeding limitation. The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provision of Part II.B.4.b. and 4.c.
b. Notice
   (1) Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible, at least ten days before the date of the bypass.
   (2) Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required in Part II.D.6(24-hour notice).
c. Prohibition of bypass.
   (1) Bypass is prohibited and the Director may take enforcement action against a permittee for bypass, unless:
      (a) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
      (b) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if the permittee could have installed adequate backup equipment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and
      (c) The permittee submitted notices as required by Part II.B.4.b.
   (2) The Director may approve an anticipated bypass, after considering its adverse effects, if the director determines that it will meet the three conditions listed above in Part II.B.4.c.(1).

5. **Upset Conditions**

a. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of Part II.B.5.b. of this section are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

b. Conditions necessary for a demonstration of upset. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

(1) An upset occurred and that the permittee can identify the specific cause(s) of the upset;

(2) The permitted facility was at the time being properly operated;

(3) The permittee submitted notice of the upset as required by Part II.D.6.; and

(4) The permittee complied with any remedial measures required by Part II.B.3.

c. Burden of proof. In any enforcement proceeding the permittee seeking to establish the occurrence of an upset has the burden of proof.

6. **Removed Substances**

Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be disposed of in a manner such as to prevent any pollutant from such materials from entering the waters of the state. Written approval for such disposal must be obtained from the ADPCE.

7. **Power Failure**

The permittee is responsible for maintaining adequate safeguards to prevent the discharge of untreated or inadequately treated wastes during electrical power failure either by means of alternate power sources, standby generators, or retention of inadequately treated effluent.

SECTION C — MONITORING AND RECORDS

1. **Representative Sampling**

Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge during the entire monitoring period. All samples shall be taken at the monitoring points specified in this permit and, unless otherwise specified, before the effluent joins or is diluted by any other wastestream, body of water, or substance. Monitoring points shall not be changed without notification to and the approval of the Director. Intermittent discharges shall be monitored.

2. **Flow Measurements**

Appropriate flow measurement devices and methods consistent with accepted scientific practices shall be selected and used to insure the accuracy and reliability of measurements of the volume of monitored discharges. The devices shall be installed, calibrated and maintained to insure the accuracy of the measurements are consistent with the accepted capability of that type of device. Devices selected shall be capable of measuring flows with a maximum deviation of less than ± 10% from true discharge rates throughout the range of expected discharge volumes and shall be installed at the monitoring point of the discharge.

3. **Monitoring Procedures**

Monitoring must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in this permit. The permittee shall calibrate and perform maintenance procedures on all monitoring and analytical instrumentation at intervals frequent enough to insure accuracy of measurements and shall insure that both calibration and maintenance activities will be conducted. An adequate analytical quality control program, including the analysis of sufficient standards, spikes, and duplicate samples to insure the accuracy of all required analytical results shall be maintained by the permittee or designated commercial laboratory. At a minimum, spikes and duplicate samples are to be analyzed on 10% of the samples.

4. **Penalties for Tampering**

The Arkansas Water and Air Pollution Control Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate, any monitoring device or method required to be maintained under the Act shall be guilty of a misdemeanor and upon conviction thereof shall be subject to imprisonment for not more than one (1) year or a fine of not more than ten thousand dollars ($10,000) or by both such fine and imprisonment.

5. **Reporting of Monitoring Results**

Monitoring results must be reported on a Discharge Monitoring Report (DMR) form (EPA No. 3320-1). Permittees are required to use preprinted DMR forms provided by ADPCE, unless specific written authorization to use other reporting forms is obtained from ADPCE. Monitoring results obtained during the previous calendar month shall be summarized and reported on a DMR form postmarked no later than the 25th day of the month following the completed reporting period to begin on the effective date of the permit. Duplicate copies of DMR's signed and certified as required by Part II.d.11 and all other reports required by Part II.D. (Reporting Requirements), shall be submitted to the Director at the following address:

Director
Arkansas Department of Pollution
Control and Ecology
8001 National Drive
P.O. Box 9583
Little Rock, AR 72219

If permittee uses outside laboratory facilities for sampling and/or analysis, the name and address of the contract laboratory shall be included on the DMR.

6. **Additional Monitoring by the Permittee**

If the permittee monitors any pollutant more frequently than required by this permit, using test procedures approved under 40 CFR 136 or as specified in this permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR. Such increased frequency shall also be indicated on the DMR.

7. **Retention of Records**

The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of the sample, measurement, report or application. This period may be extended by request of the Director at any time.

8. **Record Contents**

Records and monitoring information shall include:

a. The date, exact place, time and methods of sampling or measurements, and preservatives used, if any;

b. The individual(s) who performed the sampling or measurements;

c. The date(s) analyses were formed;

d. The individual(s) who performed the analyses;

e. The analytical techniques or methods used; and

f. The measurements and results of such analyses.

9. **Inspection and Entry**

The permittee shall allow the Director, or an authorized representative, upon the presentation of credentials and other documents as may be required by law, to:

a. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and

d. Sample, inspect or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act, and substances or parameters at any location.

SECTION D — REPORTING REQUIREMENTS

1. **Planned Changes**

The permittee shall give notice and provide plans and specification to the Director for review and approval prior to any planned physical alterations or additions to the permitted facility. Notice is required only when:

For Industrial Dischargers

a. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR Part 122.29(b).

b. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements under 40 CFR Part 122.42(a)(1).

For POTW Dischargers:

c. Any change in the facility discharge (including the introduction of any new source or significant discharge or significant changes in the quantity or quality of existing discharges of pollutants) must be reported to the permitting authority. In no case are any new connections, increased flows, or significant changes in influent quality permitted that will cause violation of the effluent limitations specified herein.

2. **Anticipated Noncompliance**

The permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

3. **Transfers**

The permit is nontransferable to any person except after notice to the Director. The Director may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the Act.

4. **Monitoring Reports**

Monitoring results shall be reported at the intervals and in the form specified in Part II.C.5. (Reporting). Discharge Monitoring Reports must be submitted even when no discharge occurs during the reporting period.

5. **Compliance Schedule**

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date. Any reports of noncompliance shall include the cause of noncompliance, any remedial actions taken, and the probability of meeting the next scheduled requirement.

6. **Twenty-four Hour Report**
   a. The permittee shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the permittee becomes aware of the circumstances. A written submission shall also be provided within 5 days of the time the permittee becomes aware of the circumstances. The written submission shall contain the following information:
      (1) a description of the noncompliance and its cause;
      (2) the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and
      (3) steps taken or planned to reduce, eliminate and prevent reoccurrence of the noncompliance.
   b. The following shall be included as information which must be reported within 24 hours:
      (1) Any unanticipated bypass which exceeds any effluent limitation in the permit;
      (2) Any upset which exceeds any effluent limitation in the permit; and
      (3) Violation of a maximum daily discharge limitation for any of the pollutants listed by the Director in Part III of the permit to be reported within 24 hours.
   c. The Director may waive the written report on a case-by-case basis if the oral report has been received within 24 hours.

7. **Other Noncompliance**
   The permittee shall report all instances of noncompliance not reported under Part II.D.4, 5, and 6, at the time monitoring reports are submitted. The reports shall contain the information listed at Part II.D.6.

8. **Changes in Discharge of Toxic Substances for Industrial Dischargers**
   The permittee shall notify the Director as soon as he/she knows or has reason to believe:
   a. That any activity has occurred or will occur which would result in the discharge, in a routine or frequent basis, of any toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the "notification levels" described in 40 CFR Part 122.42(a)(2)[48 FR 14153, April 1983, as amended at 49 FR 38046, September 26, 1984].
   b. That any activity has occurred or will occur which would result in any discharge, on a non-routine or infrequent basis, of a toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the "notification levels" described in 40 CFR Part 122.42(a)(2)[48 FR 14153, April 1, 1983, as amended at 49 FR 38046, September 26, 1984].

9. **Duty to Provide Information**
   The permittee shall furnish to the Director, within a reasonable time, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to detemine compliance with this permit. The permittee shall also furnish to the Director, upon request, copies of records required to be kept by this permit. Information shall be submitted in the form, manner, and time frame requested by the Director.

10. **Duty to Reapply**
    If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit. The complete application shall be submitted at least 180 days before the expiration date of this permit. The Director may grant permission to submit an application less than 180 days in advance but no later than the permit expiration date. Continuation of expiring permits shall be governed by regulations promulgated in ADPCE Regulation No. 6.

11. **Signatory Requirements**
    All applications, reports or information submitted to the Director shall be signed and certified.
    a. All permit applications shall be signed as follows:
       (1) For a corporation: by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means:
          (i) A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation; or
          (ii) the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25 million (in second quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.
       (2) For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or
       (3) For a municipality, State, Federal, or other public agency: by either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a Federal agency includes:
          (i) the chief executive officer of the agency, or
          (ii) A senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency.
    b. All reports required by the permit and other information requested by the Director shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:
       (1) The authorization is made in writing by a person described above.
       (2) The authorization specified either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, or position of equivalent responsibility. (A duly authorized representative may thus be either a named individual or any individual occupying a named position); and
       (3) The written authorization is submitted to the Director.
    c. Certification. Any person signing a document under this section shall make the following certification:

       "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

12. **Availability of Reports**
    Except for data determined to be confidential under 40 CFR Part 2 and Regulation 6, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Department of Pollution Control and Ecology. As required by the Regulations, the name and address of any permit applicant or permittee, permit applications, permits and effluent data shall not be considered confidential.

13. **Penalties for Falsification of Reports**
    The Arkansas Air and Water Pollution Control Act provides that any person who knowingly makes any false statement, representation, or certification in any application, record, report, plan or other document filed or required to be maintained under this permit shall be subject to civil penalties specified in Part II.A.2. and/or criminal penalties under the authority of the Arkansas Water and Air Pollution Control but (Act 472 of 1949, as amended).

PART III
OTHER CONDITIONS

1.Acute Biomonitoring Requirements for Outfall 002.

a. The permittee shall test the effluent for toxicity in accordance with the provisions in this section. Acute toxicity is defined as a statistically significant difference at the 95% confidence level between survival in the appropriate test organism in a specified effluent dilution and the control (0% effluent).

b. The permittee shall initiate the following series of tests within 60 days of the effective date of this permit. The toxicity test and associated analyses specified in paragraphs e. and f. below shall be conducted once per quarter. All test organisms, procedures, and water quality assurance criterion used shall be in accordance with the latest revision of "Methods for Measuring the Acute Toxicity of Effluent to Freshwater and Marine Organisms". The following tests shall be used:

(1) Acute 48-hour static renewal definitive toxicity test using Daphnia pulex

(2) Acute 48-hour static renewal definitive toxicity test using fathead minnow (Pimephales promelas).

c. A minimum of five effluent dilutions in addition to an appropriate control (0% effluent) shall be used in the toxicity tests. These additional effluent concentrations shall be 100%, 10%, 1%, 0.1% and 0.003%. The low-flow effluent concentration (critical dilution) is defined as 0.003% effluent; the 1/2 low-flow effluent concentration is defined as 0.1% effluent. If more than 10% of the test organisms in any control die, that test (both control and effluent) is invalid and a retest shall be conducted. Any retest shall be initiated within 15 days of the termination of the invalid test.

d. The samples shall be collected at a point following the last treatment unit. Dilution water used in toxicity tests will be receiving water collected as follows:

(1) for rivers and streams, at a point upstream but as close as possible to the discharge point;

(2) for lakes and reservoirs, at a point as close to the point of discharge as possible but unaffected by the discharge.

(3) if receiving water is unsatisfactory as a result of pre-existing in-stream toxicity (greater than 10% mortality in the control), the permittee shall substitute synthetic dilution water or, with prior written approval from ADPCE, natural water which has been determined to contain no toxicants. The permittee must also report to ADPCE the toxicity of the receiving water. Regardless of which of the above is utilized, the pH, hardness and alkalinity must be similar to that of the receiving water. When using synthetic dilution water the permittee shall insure that the concentration of total suspended solids (TSS) shall be less than or equal to that in the receiving water. Synthetic water may be used exclusively for all control and dilution water in all subsequent tests.

e. Flow-weighted 24-hour composite samples representative of dry weather flows during normal operation will be collected from outfalls(s) 002. The 24-hour composite sample consists of a a minimum of 12 effluent portions collected at equal time intervals and combined in proportion to the average flow or a sample collected proportional to flow from each outfall for the day the sample was collected. The maximum holding time for any effluent sample shall not exceed 72 hours. The toxicity tests shall be initiated within 36 hours of collection of the first 24-hour composite sample. The permittee shall collect a second 24-hour composite sample for use during the 24-hour renewal of the test solutions. Samples shall be chilled to 4 degrees centigrade when collected, shipped and/or stored.

f. When collecting composite samples for toxicity testing, the permittee shall also analyze effluent for all parameters as specified in Part 1, Section A of this permit. These analyses may be utilized as those required in Part 1, Section A for the monitoring period encompassing the toxicity test or may be in addition to the requirements of Part 1, Section A, at the permittee's discretion. The results of these analyses shall be included in the full report required in paragraph g. below.

g. The permittee shall prepare a full report of the results of the initial biomonitoring test in accordance with "Methods for Measuring the Acute Toxicity of Effluent to Freshwater and Marine Organisms", Section 13 (Report Preparation and Data Utilization), and shall forward a copy of the report to ADPCE along with information required by paragraph h. below. Subsequent full reports shall be prepared for each test but shall not be submitted unless specifically requested by the Department. However, all reports shall be retained by the permittee as required by Part II C.7 of this permit.

h. The permittee shall submit the toxicity testing information to ADPCE on forms provided by the Department along with the Discharge Monitoring Report (DMR) submitted for the end of the reporting period following the toxicity test.

i. If no toxicity occurs within the first year of toxicity testing for all organisms at the effluent dilution equivalent to 1/2 of the dilution at low flow (0.1% effluent), the permittee shall certify this information in writing to ADPCE and these biomonitoring requirements may be reduced in frequency or discontinued, with the prior, written approval of the Department.

j. If a toxicity test at one-half low flow (0.1% effluent) demonstrates toxicity during the first year of testing the permittee shall continue biomonitoring after the first year at a frequency of once per six (6) months for the duration of the permit.

k. When results of biomonitoring submitted under paragraph g. above indicate lethality in the permittee's discharge at low flow conditions (0.003% effluent), the Department may require increased biomonitoring by the permittee. Any such increase shall be in writing from the Department and will include the frequency and duration of the testing.

l. The permittee shall submit the results of the increased biomonitoring conducted under paragraph k. above to ADPCE within 15 days of the receipt of the results. If the results of the tests show no lethality at the low flow dilution, the permittee may return to the testing required under paragraph g. above, with the written authorization of the Department.

m. If the results of the verification testing required in paragraph k. above indicate lethality in the effluent at low flow dilution (0.003%), the permittee shall submit a plan for a Toxicity Reduction Evaluation (TRE) and shall continue toxicity testing at a frequency of once per month on the species showing lethality, using the sample protocols as specified in paragraphs a-f above, until the expiration date of this permit.

n. An acceptable TRE plan, including a proposed implementation schedule, shall be submitted to the Department within 60 days of receipt of the results under paragraph k. above showing a lethal effluent. The plan will be reviewed by the Department. If deemed acceptable, the permittee shall be notified and the TRE plan shall become a requirement of this permit. Incomplete or unsatisfactory TRE plans and/or schedules will be returned to the permittee for correction of deficiencies. Failure to correct deficiencies within 30 days shall be a violation of this permit. The TRE should be designed to: (1) determine what chemicals, practices, or manufacturing processes are causing toxicity; (2) determine the effectiveness of alternative control options in reducing the discharge of toxic pollutants, (3) determine what parameter or specific chemicals would be a likely indicator of toxicity for monitoring purposes; and (4) develop an implementation schedule.

o. The permittee shall conduct the TRE in accordance with the approved schedule and, upon completion, the permittee shall prepare a report which contains, at a minimum:

(1) the source of the toxicity (e.g. constituents; class of toxicants, suspected industrial contributors, etc.);

(2) results of any treatability studies conducted;

(3) discussion of alternative treatment or management techniques to reduce or eliminate toxicity;

(4) selection of the appropriate course of action to be followed by the permittee;

(5) an implementation schedule for making changes to reduce toxicity.

p. Upon completion of the TRE, the permittee shall select an appropriate course of action to reduce or eliminate the toxicity, and shall submit an application for modification of this permit, including a proposed schedule for accomplishment. Additionally, if recommended solutions include construction or modification of the treatment system, an application for a construction permit shall also be submitted. The above application shall be submitted within 90 days of completion of the TRE.

q. This permit may be reopened to require further biomonitoring studies, Toxicity Reduction Evaluation (TRE) and/or effluent limits if biomonitoring data submitted to the Department shows toxicity in the permittee's discharge. Modification or revocation of this permit is subject to the provisions of 40 CFR 122.62, as adopted by reference in ADPCE Regulation No. 6. Increased or intensified toxicity testing may also be required in accordance with Section 308 of the Clean Water Act (Act 472 of 1949, as amended).

2. Acute Biomonitoring Requirements for Outfall 001.

a. The permittee shall test the effluent for toxicity in accordance with the provisions in this section. Acute toxicity is defined as a statistically significant difference at the 95% confidence level between survival in the appropriate test organism in a specified effluent dilution and the control (0% effluent).

b. The permittee shall initiate the following series of tests following the first significant precipitation event, but no later than sixty (60) days of the effective date of this permit. The toxicity tests and associated analyses specified in paragraphs e. and f. below shall be conducted once per quarter for 1 year. All test organisms, procedures, and water quality assurance criterion used shall be in accordance with the latest revision of "Methods for Measuring the Acute Toxicity of Effluent to Freshwater and Marine Organisms", EPA/600/4-85/013. The following tests shall be used:

(1) Acute 48-hour static renewal definitive toxicity test using Daphnia pulex

(2) Acute 48-hour static renewal definitive toxicity test using fathead minnow (Pimephales promelas).

c. A minimum of five effluent dilutions in addition to an appropriate control (0% effluent) shall be used in the toxicity tests. These effluents concentrations shall be 100%, 50%, 25%, 12.5%, and 6.25%. The low-flow effluent concentration (critical dilution) is defined as 100% effluent. If more than 10% of the test organisms in any control die, the toxicity test, including control and all effluent dilution shall be repeated. Any retest shall be initiated within 15 days of the termination of the invalid test.

d. The samples shall be collected at a point following the last treatment unit. Dilution water used in toxicity tests will be receiving water collected as follows:

(1) for rivers and streams, at a point upstream but as close as possible to the discharge point;

(2) for lakes and reservoirs, at a point as close to the point of discharge as possible but unaffected by the discharge.

(3) if receiving water is unsatisfactory as a result of pre-existing in-stream toxicity (greater than 10% mortality in the control), the permittee shall substitute synthetic dilution water or, with prior written approval from ADPCE, natural water which has been determined to contain no toxicants. The permittee must also report to ADPCE the

toxicity of the receiving water. Regardless of which of the above is utilized, the pH, hardness and alkalinity must be similar to that of the receiving water. When using synthetic dilution water the permittee shall insure that the concentration of total suspended solids (TSS) shall be less than or equal to that in the receiving water. Synthetic water may be used exclusively for all control and dilution water in all subsequent tests.

e. Grab samples representative of dry weather flows during normal operation will be collected from outfall 001. The maximum holding time for any effluent sample shall not exceed 72 hours. The toxicity tests shall be initiated within 36 hours of collection of the first grab sample. The permittee shall collect a second grab sample for use during the 24-hour renewal of the test solutions. Samples shall be chilled to 4 degrees centigrade when collected, shipped and/or stored.

f. When collecting samples for toxicity testing, the permittee shall also analyze effluent for all parameters as specified in Part 1, Section A of this permit. These analyses may be utilized as those required in Part 1, Section A for the monitoring period encompassing the toxicity test or may be in addition to the requirements of Part 1, Section A, at the permittee's discretion. The results of these analyses shall be included in the full report required in paragraph g. below.

g. The permittee shall prepare a full report of the results of the initial biomonitoring test in accordance with "Methods for Measuring the Acute Toxicity of Effluent to Freshwater and Marine Organisms", Section 13 (Report Preparation and Data Utilization), and shall forward a copy of the report to ADPCE along with information required by paragraph h. below. Subsequent full reports shall be prepared for each test but shall not be submitted unless specifically requested by the Department. However, all reports shall be retained by the permittee as required by Part II C.7 of this permit.

h. The permittee shall submit a summary of the toxicity testing information to ADPCE on summary forms provided by the Department along with the Discharge Monitoring Report (DMR) submitted for the end of the reporting period following all toxicity tests.

i. If results of the toxicity tests at the low flow dilution (100% effluent) demonstrates lethality, the permittee shall resample and again conduct the toxicity test(s) for the species that showed lethality. The retests shall consist of two (2) consecutive toxicity tests conducted within thirty (30) days of receiving information demonstrating lethality at low flow.

j. If the results of the retests continue to demonstrate lethality, and after written notification ~~of~~ From the Department, the permittee may be required to submit to ADPCE an approvable plan for conducting a Toxicity Reduction Evaluation (TRE). A TRE plan would specify the approach and methodology to be used in performing a TRE and the date on which it would commence.

k. This permit may be reopened to require further biomonitoring studies, Toxicity Reduction Evaluation (TRE) and/or effluent limits if biomonitoring data submitted to the Department shows toxicity in the permittee's discharge. Modification or revocation of this permit is subject to the provisions of 40 CFR 122.62, as adopted by reference in ADPCE Regulation No. 6. Increased of intensified toxicity testing may also be required in accordance with Section 308 of the Clean Water Act and Section 8-4-201 of the Arkansas Water and Air Pollution Control Act (Act 472 or 1949, as amended).

PART IV —
SECTION A — DEFINITIONS

All definitions contained in Section 502 of the Clean Water Act shall apply to this permit and are incorporated herein by reference. Additional definitions of words or phrases used in this permit are as follows:

1. "Act" means the Clean Water Act, Public Law 95-217(33. U.S.C. 1251 et seq.) as amended.
2. "Administrator" means the Administrator of the U.S. Environmental Protection Agency.
3. "Applicable effluent standards and limitations" means all State and Federal effluent standards and limitations to which a discharge is subject under the Act, including, but not limited to, effluent limitations, standards of performance, toxic effluent standards and prohibitions, and pretreatment standards.
4. "Applicable water quality standards" means all water quality standards to which a discharge is subject under the federal Clean Water Act and which have been (a) approved or permitted to remain in effect by the Administrator following submission to the Administrator pursuant to Section 303(a) of the Act, or (b) promulgated by the Director pursuant to Section 303(b) or 303(c) of the Act, and standards promulgated under regulation No. 2, as amended, (regulation establishing water quality standards for surface waters of the State of Arkansas).
5. "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility.
6. "Daily Discharge" means the discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in terms of mass, the "daily discharge" is calculated as the total mass of the pollutant discharged over the sampling day. For pollutants with limitations expressed in other units of measurement, the "daily discharge" is calculated as the average measurement of the pollutant over the sampling day. "Daily discharge" determination of concentration made using a composite sample shall be the concentration of the composite sample. When grab samples are used, the "daily discharge" determination of concentration shall be the arithmetic average (weighted by flow value) of all the samples collected during that sampling day.
7. "Daily Average" (also known as monthly average) discharge limitations means the highest allowable average of "daily discharge(s)" over a calendar month, calculated as the sum of all "daily discharge(s)" measured during a calendar month divided by the number of "daily discharge(s)" measured during that month. When the permit establishes daily average concentration effluent limitations or conditions, the daily average concentration means the arithmetic average (weighted by flow) of all "daily discharge(s)" of concentration determined during the calendar month where C = daily concentration, F = daily flow and n = number of daily samples; daily average discharge =

$$\frac{C1F1 + C2F2 + \ldots CnFn}{F1 + F2 + \ldots + Fn}$$

8. "Daily Maximum" discharge limitation means the highest allowable "daily discharge" during the calendar month.
9. "Department" means the Arkansas Department of Pollution Control and Ecology (ADPCE).
10. "Director" means the Administrator of the U.S. Environmental Protection Agency and/or the Director of the Arkansas Department of Pollution Control and Ecology.
11. "Grab sample" means an individual sample collected in less than 15 minutes in conjunction with an instantaneous flow measurement.
12. "Industrial User" means a nondomestic discharger, as identified in 40 CFR 403, introducing pollutants to a publicly-owned treatment works.
13. "National Pollutant Discharge Elimination System" means the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under sections 307, 402, 318, and 405 of the Clean Water Act.
14. "POTW" means a Publicly Owned Treatment Works.
15. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in productions.
16. "ADPCE" means the Arkansas Department of Pollution Control and Ecology.
17. "Sewage sludge" means the solids, residues, and precipitate separated from or created in sewage by the unit processes of a publicly-owned treatment works. Sewage as used in this definition means any wastes, including wastes from humans, households, commercial establishments, industries, and storm water runoff, that are discharged to or otherwise enter a publicly-owned treatment works.
18. "7-day average" discharge limitation, other than for fecal coliform bacteria, is the highest allowable arithmetic means of the values for all effluent samples collected during the calendar week. The 7-day average for fecal coliform bacteria is the geometric mean of the values of all effluent samples collected during the calendar week. The DMR should report the highest 7-day average obtained during the calendar month. For reporting purposes, the 7-day average values should be reported as occurring in the month in which the Saturday of the calendar week falls in.
19. "30-day average", other than for fecal coliform bacteria, is the arithmetic mean of the daily values for all effluent samples collected during a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month. The 30-day average for fecal coliform bacteria is the geometric mean of the values for all effluent samples collected during a calendar month.
20. "24-hour composite sample" consists of a minimum of 12 effluent portions collected at equal time intervals over the 24-hour period and combined proportional to flow or a sample collected at frequent intervals porportional to flow over the 24-hour period.
21. "12-hour composite sample" consists of 12 effluent portions collected no closer together than one hour and composited according to flow. The daily sampling intervals shall include the highest flow periods.
22. "6-hour composite sample" consists of six effluent portions collected no closer together than one hour (with the first portion collected no earlier than 10:00 a.m.) and composited according to flow.
23. "3-hour composite sample" consists of three effluent portions collected no closer together than one hour (with the first portion collected no earlier than 10:00 a.m.) and composited according to flow.
24. "Treatment works" means any devices and systems used in the storage, treatment, recycling, and reclamation of municipal sewage and industrial wastes, of a liquid nature to implement section 201 of the Act, or necessary to recycle reuse water at the most economic cost over the estimated life of the works, including intercepting sewers, sewage collection systems, pumping, power and other equipment, and alterations thereof; elements essential to provide a reliable recycled supply such as standby treatment units and clear well facilities, and any works, including site acquisition of the land that will be an integral part of the treatment process or is used for ultimate disposal of residues resulting from such treatment.
25. "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee. Any upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, lack of preventive maintenance, or careless or improper operations.
26. For "fecal coliform bacteria", a sample consists of one effluent grab portion collected during a 24-hour period at peak loads.
27. "Dissolved oxygen", shall be defined as follows:
    a. When limited in the permit as a monthly minimum, shall mean the lowest acceptable monthly average value, determined by averaging all samples taken during the calendar month;
    b. When limited in the permit as an instantaneous minimum value, shall mean that no value measured during the reporting period may fall below the stated value.
28. The term "MGD" shall mean million gallons per day.
29. The term "mg/l" shall mean milligrams per liter or parts per million (ppm).
30. The term "μg/l" shall mean micrograms per liter or parts per billion (ppb).

NOTICE OF VIOLATIONS
AND REGULATORY CORRESPONDENCE

CEDAR CHEMICAL CORPORATION

P.O. Box 2749, Hwy. 242 S. • West Helena, AR 72390
(501) 572-3701 • Fax No. 501-572-3795

Arkansas Department of Pollution Control & Ecology
P.O. Box 9583
Little Rock, AR 72209

Re: AR 003 6412 - Report of Non-Compliance - March 1991

Outfall 001 is an intermittent discharge of excess stormwater. A grab sample for rainfall on March 1 showed COD and pH out of permit limits.

Attached is a summary of the stormwater analysis for the period of December 1990 through April 1991. All analysis for April is within permit limits.

A change in the permit parameters form grab sampling to composite samples, or a more frequent period of grabs, will probably be more representative of the actual total discharge.

Date	Flow	pH Low	pH High	COD	Chloride	Suspended Solids	Ammonia Nitrogen	Oil/Grease	Ph[illegible]s ([illegible]b)	Tot Pesticid (ppb)
12/18/90	220,000	7.1	9.9	812.9	323.3	287.0	0.0	22.2	180.0	1275.1
[illegible]/90	160	9.0	9.0	697.9	614.3	978.6	0.0	7.7	6100.0	819.5
1/01/91	43,200	6.1	8.8	90.9	291.0	219.5	3.0	0.0	1850.0	560.4
1/09/91	54,720	7.8	7.8	63.3	258.7	190.0	2.0	8.8	135.0	486.5
2/19/91	376,000	7.9	7.9	121.0	37.7	391.6	2.3	4.8	82.0	1331.7
2/20/91	103,680	8.5	8.5	387.3	541.5	191.0	10.5	4.5	2208.0	769.4
3/01/91	1,100,000	9.2	9.2	512.7	315.0	182.0	24.3	8.6	165.0	1679.8
4/04/91	590,000	7.9	7.9	86.3	32.7	672.5	9.1	3.6	172.5	1044.2
4/12/91	1,360,000	8.2	8.2	86.6	23.5	705.7	4.7	7.0	40.0	516.6
4/13/91	1,040,000	7.2	7.2	65.0	15.5	2226.7	2.5	2.5	39.0	558.6
Permit 001				100				15		

Permit 002

No samples?

mg/l Cr	mg/l Pb
.4	.4

CEDAR CHEMICAL CORPORATION

P.O. Box 2749. Hwy. 242 S. • West Helena. AR 72390
(501) 572-3701 • Fax No. 501-572-3795

RECEIVED
APR 3 1991

March 27, 1991

Arkansas Department of Pollution Control & Ecology
8001 National Drive - P.O. Box 9583
Little Rock, AR 72209

Re: NPDES AR 003 6412 - February 1991 Report

Dear Sirs:

We exceeded permit conditions for COD in February, but have no definitive reasons as to why. Suspended solids levels were also very high due to construction on the plant site. We have graded and tilled most of the open areas on the plant site and planted grass seed. This resulted in excessive erosion due to the heavy rains in February. We anticipate that this will ease further erosion as well as make the area a more pleasant sight.

Please note on the DMR for Outfall 001 (TX1 A), the permit sample type stated is Composite, however the permit calls for a Grab sample. The samples taken were indeed grab samples. Perhaps composite samples might be a better choice. Two grab samples taken 24 hours apart for our Outfall 001 are not very representative of the actual discharge since it depends on the amount, duration, and intensity of rainfall.

Sincerely,

J Porter

Joe E. Porter
Environmental Engineer

#36412

CEDAR CHEMICAL CORPORATION

P.O. Box 2749, Hwy. 242 S. • West Helena, AR 72390
(501) 572-3701 • Fax No. 501-572-3795

RECEIVED
FEB 18 1991

Feb 12, 1991

Leda F. Johnson
Arkansas Department of Pollution Control & Ecology
P.O. Box 9583 - 8001 National Drive
Little Rock, AR 72209

RE: NPDES Permit No. AR0036412
Report of noncompliance

In November and December 1990, Ammonia-nitrogen permit limits was exceeded on 11/7/90 for daily maximum. For the dates of 10/31/90 to 11/7/90 the concentration changed from 40.2 to 103 mg/liter. We really don't believe this to be realistic and had only recently changed our analytical procedure from wet chemistry to electrode. The electrode method does give us consistently higher values for which we have no current explanation. Again in December laboratory values went from 81.0 mg/liter on 12/12/90 to 190 mg/liter on 12/19/90. We are submitting samples to third party analysis in an effort to determine the proper ammonia-nitrogen values.

The maximum values for Outfall 001 in December are valid for very low flow; approximately 10% of the 220,000 total discharge. We extended our discharge time period at reduced flow rate in order to collect two grab samples for a biomonitoring test. We also feel this greatly influenced the results of that test. It will be repeated, per our permit, as weather conditions warrant.

This report should have been submitted earlier, but the ammonia laboratory analysis is still under investigation. Should you have any questions please feel free to contact us.

Sincerely,

JE Porter

Joe E. Porter
Environmental Engineer

cc: J.H. Miles
T.J. Lodice

CEDAR CHEMICAL CORPORATION

P.O. Box 2749. Hwy. 242 S. • West Helena. AR 72390
(501) 572-3701 • Fax No. 501-572-3795

Diana Buck (6W-EAO)
U.S. Environmental Protection Agency
1445 Ross Avenue, Suite 1200
Dallas, Tx. 75202

Sep 15, 1989

Re: NPDES Permit No. AR 003 6412

Dear Ms. Buck:

In following up our telephone conversation, we are providing you with the following information:

1. The first date is in error. The correct date is 4/17/88
2. The second date should be 11/26/88
3. The third date should be 1/30/89

Additional information was reported on the DMR form for the reporting month. Copies of these reports are attached and the specific dates you requested are as noted above.

Sincerely,

JE Porter

Joe E. Porter
Environmental Engineer

cc: Mr. Vince Blubaugh
Chief, Water Division - ADPC&E
John H. Miles

1 - Permit/CD
2 - [illegible] mail
3 - [illegible]
4 - [illegible] Sum. Log
5 - NCR
6 - Correspondence
7 - CRAS
Date Filed /
Clerk's Inits.

RECEIVED
OCT 5 - 1989
6W-EA

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VI
1445 ROSS AVENUE, SUITE 1200
DALLAS, TEXAS 75202

RECEIVED

OCT 5 - 1989

6W-EA

September 7, 1989

REPLY TO: 6W-EAO

Mr. Joe E. Porter
Environmental Engineer
Cedar Chemical Corp.
P.O. Box 2749
West Helena, Arkansas 72390

Re: NPDES Permit No. AR0036412

Dear Mr. Porter:

We note that your facility is in violation of the above referenced permit, specifically, the following violations:

	Date 88	Outfall	Parameter	Violation	Permit Limit
	4/17/~~89~~	001	COD, 7-day avg.	134.5 mg/l	100 mg/l
			pH, max.	9.3 s.u.	9.0 s.u.
11-26-88	*11/88	001	COD, 7-day avg.	134.8 mg/l	100 mg/l
[illegible]-89	*1/89	001	COD, 7-day avg.	181 mg/l	100 mg/l

Noncompliance reports for the above asterisked violations have not been received. You need to submit the information required in your permit within ten (10) days of receipt of this letter.

Your facility should take whatever remedial action is necessary to prevent the recurrence of the violations noted above.

A report of the above violations will be placed in your file. The report will be used in our consideration of the appropriate action to be taken in the event of future violations. Future enforcement actions could include administrative compliance orders, administrative penalty orders, and/or referral to the United States Department of Justice for judicial action with monetary fines.

If you have any questions, please contact me at the above address or telephone (214) 655-6455.

Sincerely yours,

Telecon - Diana
OK - date is 88 for April
OK - compliance report is on DMR, but needs specific dates

Diana Buck

Diana Buck
Environmental Assistant
Enforcement Branch (6W-EAO)

cc: Mr. Vince Blubaugh
Chief, Water Division
Arkansas Department of Pollution
Control and Ecology

CEDAR CHEMICAL CORPORATION

24th Floor • 5100 Poplar Avenue • Memphis, TN 38137 • 901-685-5348

REPLY TO: P. O. BOX 2749
WEST HELENA, AR 72390
(501) 572-3701

June 21, 1988

Diana Buck (6W-EAO)
U.S. Environmental Protection Agency
1445 Ross Avenue
Dallas, Tx. 75202

Re: NPDES Permit No. AR0036412

Dear Ms. Buck:

On March 31, 1988 we experienced heavy rainfall which caused us to use our Outfall 001 for stormwater discharge. Four samples taken during the discharge period showed COD valves ranging from 49.3 to 201.8 with an average valve to 124.4 mg/liter.

On April 17, we again released excess rainfall with a pH of 9.3 and an average COD of 134.5.

We have found no particular reason for these values to be outside stated permit limits. All other parameters were in order and there is no reason to believe that these discharges would have any adverse effect on human health or the environment. An additional discharge in the month of May had all parameters within permit limits.

Sincerely,

J E Porter

Joe E. Porter
Environmental Engineer

cc: John Miles

RECEIVED

OCT 3 - 1989

6W-EA

① Buck

CEDAR CHEMICAL CORPORATION

24th Floor • 5100 Poplar Avenue • Memphis, TN 38137 • 901-685-5348

REPLY TO: P. O. BOX 2749
WEST HELENA, AR 72390
(501) 572-3701

June 21, 1988

Diana Buck (6W-EAO)
U.S. Environmental Protection Agency
1445 Ross Avenue
Dallas, Tx. 75202

Re: NPDES Permit No. AR0036412

Dear Ms. Buck:

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On April 17, we again released excess rainfall with a pH of 9.3 and an average COD of 134.5.

We have found no particular reason for these valves to be outside stated permit limits. All other parameters were in order and there is no reason to believe that these discharges would have any adverse effect on human health or the environment. An additional discharge in the month of May had all parameters within permit limits.

Sincerely,

J E Porter

Joe E. Porter
Environmental Engineer

cc: John Miles

Permit/CD
AC & AC mail
Perm. Sum. Log
Correspondence
Date Filed
Clerk's Inits.

RECEIVED
JUN 24 1988
6W-EA

MICROFILMED

STATE OF ARKANSAS
DEPARTMENT OF POLLUTION CONTROL AND ECOLOGY
8001 NATIONAL DRIVE, P.O. BOX 8913
LITTLE ROCK, ARKANSAS 72209
PHONE: (501)562-7444

MAY 07 1991

Mr Joe E Porter
Cedar Chemical Corporation
P O Box 2749
W Helena, AR 72390

RE: NPDES Permit No. AR0036412

Dear Sir:

We have reviewed your NPDES file and note the following recent violations of your permit for the period ending MAR 31 1991:

OUTFALL	PARAMETER	VIOLATION	LIMIT	UNITS
001A	COD	512.7	100	mg/l daily max.
001A	PH	9.2	9.0	S. U. max.
002A	NO VIOLATIONS			

Violations of your NPDES permit are subject to enforcement action under the Arkansas Water and Air Pollution Control Act. You are expected to take all reasonable measures necessary to eliminate or prevent the recurrence of such violations.

The Noncompliance report submitted with your DMR was not complete. The reasons for noncompliance and the actions taken to correct the problems are required to be reported. A corrected NCR is to be submitted within 10 days of the date of this letter.

We have placed in your file a list of the above violations as well as any corrective measures you have reported. In the event of future violations, we will use this information in determining what appropriate actions to take.

If you have any questions on this matter, please contact me at the above address or telephone (501) 562-7444.

Sincerely,

Leda F. Johnson
Enforcement Assistant
NPDES Enforcement Section

STATE OF ARKANSAS
DEPARTMENT OF POLLUTION CONTROL AND ECOLOGY
8001 NATIONAL DRIVE, P.O. BOX 8913
LITTLE ROCK, ARKANSAS 72219-8913
PHONE: (501)562-7444
FAX: (501)562-4632

May 3, 1991

Mr. Joe E. Porter
Environmental Engineer
Cedar Chemical Corporation
Post Office Box 2749
West Helena, Arkansas 72390

RE: Biomonitoring data results--001 outfall

Dear Mr. Porter:

Our review of your 12/20/90 and 02/20/91 acute biomonitoring reports indicated significant lethality to both Daphnia pulex and Pimphales promelas. In accordance with your NPDES permit, Part III, 2.i., a retest for both species is required which consists of two (2) consecutive toxicity tests conducted within thirty (30) days of receipt of this letter. If these tests also demonstrate lethality, then a toxicity reduction evaluation plan (TRE) may be required by the Department.

If you have any questions or need further information regarding this matter, please contact us.

Sincerely,

Bob Singleton

Bob Singleton
Engineer, Water Division

cc. Joslyn Burleson

STATE OF ARKANSAS
DEPARTMENT OF POLLUTION CONTROL AND ECOLOGY
8001 NATIONAL DRIVE, P.O. BOX 8913
LITTLE ROCK, ARKANSAS 72219-8913
PHONE:(501)562-7444
FAX:(501)562-4632

RECEIVED
APR 23 1991

April 8, 1991

Mr. Joe E. Porter,
Environmental Engineer
Cedar Chemical Corporation
Post Office Box 2749
West Helena, Arkansas 72390

RE: NPDES Permit AR0036412

?

Dear Mr. Porter:

We are in receipt of your discharge monitoring reports for Outfalls 001 and 002, and the results of the Biomonitoring testing on Outfall 002. However, we have not received the Biomonitoring report on Outfall 001, which is required by your NPDES permit--see Part III, pages 5-7.

Please submit this report within 10 days of the date of this letter so we can correct your file.

If you have any questions, you can call me at (501) 570-2138.

Sincerely,

Leda F. Johnson

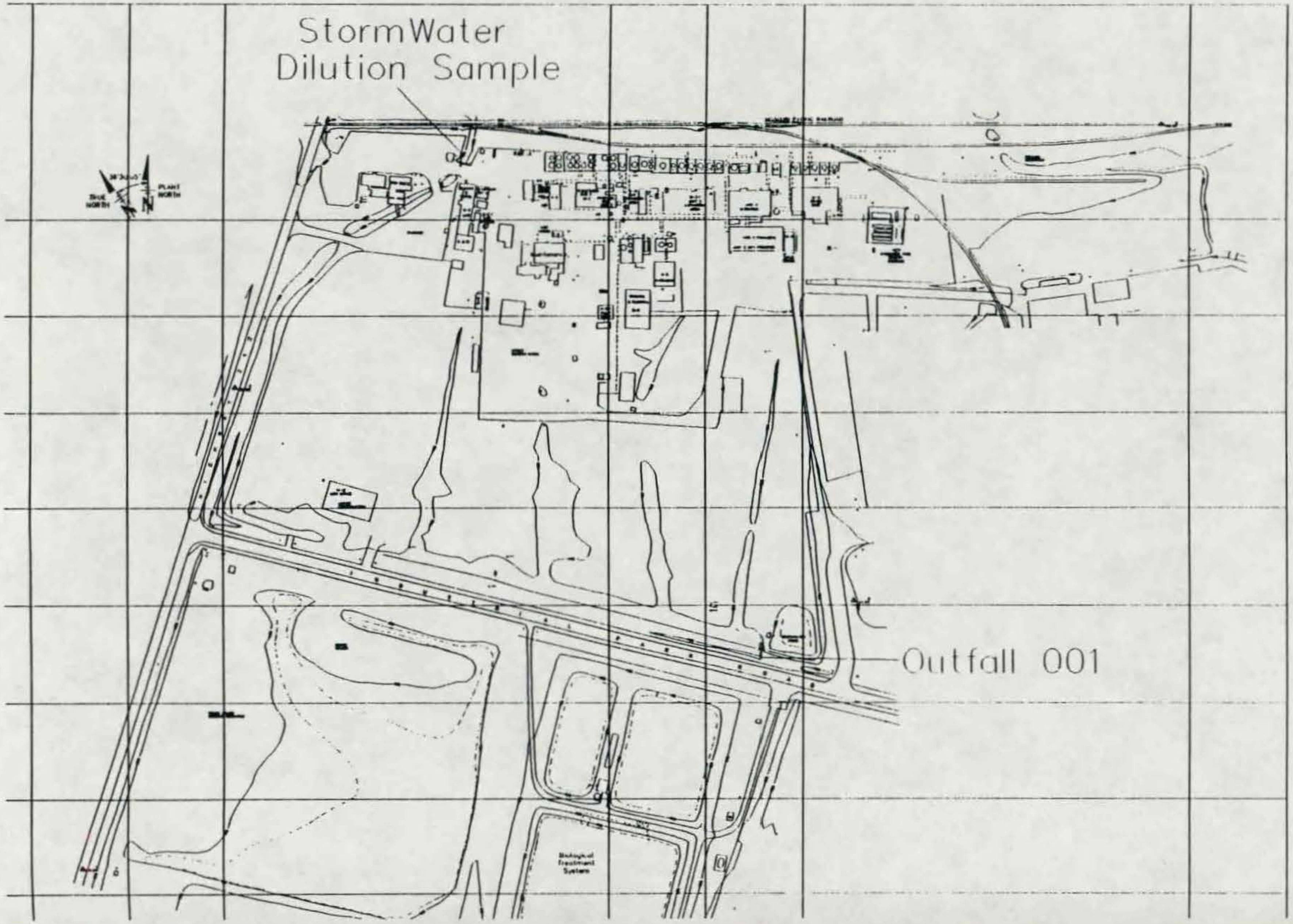
Leda F. Johnson
Administrative Assistant
NPDES Enforcement Section

cc: Water Inspector
Bob Singleton, ADPCE

562-7444 x 226

CEDAR1729

4/11 -> ~~[illegible]~~ Wants copy of original laboratory report.
Did receive DMR report OK.


StormWater
Dilution Sample
Outfall 001

STATE OF ARKANSAS
DEPARTMENT OF POLLUTION CONTROL AND ECOLOGY
8001 NATIONAL DRIVE, P.O. BOX 8913
LITTLE ROCK, ARKANSAS 72209
PHONE: (501)562-7444

APR 04 1991

Mr Joe E Porter
Cedar Chemical Corporation
P O Box 2749
W Helena, AR 72390

RE: NPDES Permit No. AR0036412

Dear Sir:

We have reviewed your NPDES file and note the following recent violations of your permit for the period ending FEB 28 1991:

OUTFALL	PARAMETER	VIOLATION	LIMIT	UNITS
001A	COD	387.3	100	mg/l daily max.
TX1A		1	report	
TX2A	NO VIOLATIONS			
002A	NO VIOLATIONS			

Violations of your NPDES permit are subject to enforcement action under the Arkansas Water and Air Pollution Control Act. You are expected to take all reasonable measures necessary to eliminate or prevent the recurrence of such violations.

We have placed in your file a list of the above violations as well as any corrective measures you have reported. In the event of future violations, we will use this information in determining what appropriate actions to take.

If you have any questions on this matter, please contact me at the above address or telephone (501) 562-7444.

Sincerely,

Leda F. Johnson

Leda F. Johnson
Enforcement Assistant
NPDES Enforcement Section

STATE OF ARKANSAS
DEPARTMENT OF POLLUTION CONTROL AND ECOLOGY
8001 NATIONAL DRIVE, P.O. BOX 8913
LITTLE ROCK, ARKANSAS 72219-8913
PHONE:(501)562-7444
FAX:(501)562-4632

February 5, 1991

Mr. Joe Porter, Environmental Engineer
Cedar Chemical Corporation
Post Office Box 2749
West Helena, Arkansas 72390

RE: NPDES Permit No. AR0036412

Dear Mr. Porter:

We have reviewed your NPDES file and note the following recent violation(s) of your permit:

DATE	OUTFALL	PARAMETER	VIOLATION	PERMIT LIMIT
12/90	001A	*COD, daily max.	812.9 mg/l	100 mg/l
12/90	001A	*Oil and Grease; daily maximum	22.2 mg/l	15 mg/l
12/90	001A	*Ammonia-Nitrogen, 30 day average	12.6 lbs/day	10 lbs/day
		daily maximum	33.9 lbs/day	20 lbs/day

This report was submitted after the Jan. 25th deadline. This is a violation of your NPDES permit. In the future, all DMRs are to be postmarked before the 25th of the month following the end of the monitoring period as required by your permit.

Violations of your NPDES permit are subject to enforcement action under the Arkansas Water and Air Pollution Control Act. You are expected to take all reasonable measures necessary to eliminate or prevent the recurrence of such violations.

A noncompliance report for the above asterisked violation has not been received. Part II, Section D, 5, 6, and 7 of your permit specifically deals with the requirements of submitting noncompliance reports. These reports need to include the cause of noncompliance, the length of time it is expected to continue, and the corrective actions taken to prevent the noncompliance from recurring.

COMPLIANCE FILES
#36412

Comm for TCS

Noncompliance reports are required by your permit. By not submitting these reports when you violate the effluent limits in your permit, you are violating the requirements of the permit and, if not corrected, can be subject to enforcement action. This is a very important requirement that cannot be overlooked. A noncompliance report on the effluent violations reported on the November DMR has not yet been received in response to the warning letter mailed on Jan. 8, 1991.

If you have any questions on this matter, please contact me at the above address or telephone (501) 570-2138.

Sincerely,

Leda F. Johnson

Leda F. Johnson
Administrative Assistant
NPDES Enforcement Section

cc: Water Inspector
Mark Bradley, Enforcement Engineer

CEDAR1673

STATE OF ARKANSAS
DEPARTMENT OF POLLUTION CONTROL AND ECOLOGY
8001 NATIONAL DRIVE, P.O. BOX 9583
LITTLE ROCK, ARKANSAS 72209
PHONE: (501)562-7444

JAN 08 1991

Mr Joe E Porter
Cedar Chemical Corporation
P O Box 2749
W Helena, AR 72390

RE: NPDES Permit No. AR0036412

Dear Sir:

We have reviewed your NPDES file and note the following recent violations of your permit for the period ending NOV 30 1990:

OUTFALL	PARAMETER	VIOLATION	LIMIT	UNITS ---
002A	NH3-N	11.7	10	lbs/day monthly avg.
002A	NH3-N	21.3	20	lbs/day 7-day avg.

Violations of your NPDES permit are subject to enforcement action under the Arkansas Water and Air Pollution Control Act. You are expected to take all reasonable measures necessary to eliminate or prevent the recurrence of such violations. A non-compliance report is required for all violations. Your failure to submit required non-compliance reports constitutes additional violations to your permit.

We have placed in your file a list of the above violations as well as any corrective measures you have reported. In the event of future violations, we will use this information in determining what appropriate actions to take.

If you have any questions on this matter, please contact me at the above address or telephone (501) 562-7444.

Sincerely,

Leda F. Johnson

Leda F. Johnson
Enforcement Assistant
NPDES Enforcement Section

NCR
CORRESPONDENCE

UNITED ST[illegible] ES ENVIRONMENTAL PROTECTION [illegible] ENCY
6608 Hornwood Drive
Houston, Texas 77074

SUBJECT: Laboratory Report: Vertac, Inc., West Helena, Arkansas

DATE: 27 NOV 1979

FROM: William D. Langley, Chief, Laboratory Services Section, Houston Branch, 6ASAHL

TO: Oscar Ramirez, Acting Director
Surveillance and Analysis Division, 6ASA

Thru: Malcolm F. Kallus
Chief, Houston Branch, 6ASAH

A sample of waste treatment effluent, outfall 002, taken by L. Frank Mayhue at Vertac, Inc., West Helena, Arkansas, on July 24, 1979, was received at the Houston Branch Laboratory on August 9 with request for complete priority pollutant type analysis. The following are the results of our analytical characterization of this sample.

Parameter Analyzed	Concentration Found
Antimony, Sb	<20 ug/l (ppb)
Arsenic, As	<20 "
Beryllium, Be	<20 "
Cadmium, Cd	60 "
Chromium, Cr	<20 "
Copper, Cu	65 "
Lead, Pb	90 "
Mercury, Hg	<0.2 "
Nickel, Ni	155 "
Selenium, Se	<10 "
Silver, Ag	25 "
Thallium, Tl	Analytical Interference
Zinc, Zn	111 ug/l (ppb)
Cyanide, Total as CN	20 "
Phenols	96 "

Chlorinated Pesticides and PCB's by Gas Chromatography/Electron Detector

None detected. Detection limit = <0.1 ug/l for chlorinated pesticides; <1 ug/l for PCB's.

Organics by Gas Chromatography/Mass Spectrometry

Dichlorobenzeneamine,	isomer 1	30 ug/l (ppb)
	isomer 2	440 ug/l (ppb)

RECEIVED
NOV 29 1979
EPA
REGION VI
S & A DIV.
FLD. ASST.

RECEIVED
DEC 20 1979
6AEG

EPA Form 1320-6 (Rev. 6-72)

OMB No. 158-R0

NPDES COMPLIANCE INSPECTION REPORT (Coding instructions on back of last page)

TRANSACTION CODE	NPDES	YR MO DA	TYPE	INSPECTOR	FAC TYPE	TIME
[illegible] 5	[illegible]	[illegible]	[illegible]	S	[illegible]	1100 a.m.

REMARKS

ADDITIONAL Receiving Water

Mississippi River

SECTION A - Permit Summary

NAME AND ADDRESS OF FACILITY (Include County, State and ZIP code)		EXPIRATION DATE
Vertac, Inc. P.O. Box 2648 West Helena, Ar 72390	Phillip County	21 Feb 82
		ISSUANCE DATE: 22 Feb 77
RESPONSIBLE OFFICIAL: J. W. Shackleford	TITLE: Plant Manager	PHONE: 501-572-3701
FACILITY REPRESENTATIVE: Joe Porter	TITLE: Environmental Engineer	PHONE: 501-572-3701

SECTION B - Effluent Characteristics (Additional sheets attached ______)

PARAMETER/ OUTFALL		MINIMUM	AVERAGE	MAXIMUM	ADDITIONAL
	SAMPLE MEASUREMENT				
	PERMIT REQUIREMENT				
	SAMPLE MEASUREMENT				
	PERMIT REQUIREMENT				
	SAMPLE MEASUREMENT				
	PERMIT REQUIREMENT				
	SAMPLE MEASUREMENT				
	PERMIT REQUIREMENT				
	SAMPLE MEASUREMENT				
	PERMIT REQUIREMENT				

N/A

SECTION C - Facility Evaluation (S = Satisfactory, U = Unsatisfactory, N/A = Not applicable)

S EFFLUENT WITHIN PERMIT REQUIREMENTS	U OPERATION AND MAINTENANCE	S SAMPLING PROCEDURES
S RECORDS AND REPORTS	S COMPLIANCE SCHEDULE	S LABORATORY PRACTICES
S PERMIT VERIFICATION	S FLOW MEASUREMENTS	OTHER:

SECTION D - Comments Aerators not operating - odor - corrective action underway

SECTION E - Inspection/Review

SIGNATURES	AGENCY	DATE	ENFORCEMENT DIVISION USE ONLY
INSPECTED BY [signature]	DPC&E	79-8-2	COMPLIANCE STATUS
INSPECTED BY			☐ COMPLIANCE ☐ NONCOMPLIANCE
REVIEWED BY			

EPA FORM 3560-3 (9-77) REPLACES EPA FORM T-51 (9-76) WHICH IS OBSOLETE.

[illegible] 9/21/79

Sections F thru L: Complete on all inspections, as appropriate. N/A = Not Applicable

PERMIT NO. AR0036412

SECTION F - Facility and Permit Background

ADDRESS OF PERMITTEE IF DIFFERENT FROM FACILITY (Including City, County and ZIP code)	DATE OF LAST PREVIOUS INVESTIGATION BY EPA/STATE
N/A	78-6-14
	FINDINGS

SECTION G - Records and Reports

RECORDS AND REPORTS MAINTAINED AS REQUIRED BY PERMIT. ☒ YES ☐ NO ☐ N/A (Further explanation attached ______)

DETAILS:

(a) ADEQUATE RECORDS MAINTAINED OF:			
(i) SAMPLING DATE, TIME, EXACT LOCATION	☒ YES	☐ NO	☐ N/A
(ii) ANALYSES DATES, TIMES	☒ YES	☐ NO	☐ N/A
(iii) INDIVIDUAL PERFORMING ANALYSIS	☒ YES	☐ NO	☐ N/A
(iv) ANALYTICAL METHODS/TECHNIQUES USED	☒ YES	☐ NO	☐ N/A
(v) ANALYTICAL RESULTS (e.g., consistent with self-monitoring report data)	☒ YES	☐ NO	☐ N/A
(b) MONITORING RECORDS (e.g., flow, pH, D.O., etc.) MAINTAINED FOR A MINIMUM OF THREE YEARS INCLUDING ALL ORIGINAL STRIP CHART RECORDINGS (e.g. continuous monitoring instrumentation, calibration and maintenance records).	☒ YES	☐ NO	☐ N/A
(c) LAB EQUIPMENT CALIBRATION AND MAINTENANCE RECORDS KEPT.	☒ YES	☐ NO	☐ N/A
(d) FACILITY OPERATING RECORDS KEPT INCLUDING OPERATING LOGS FOR EACH TREATMENT UNIT.	☒ YES	☐ NO	☐ N/A
(e) QUALITY ASSURANCE RECORDS KEPT.	☒ YES	☐ NO	☐ N/A
(f) RECORDS MAINTAINED OF MAJOR CONTRIBUTING INDUSTRIES (and their compliance status) USING PUBLICLY OWNED TREATMENT WORKS.	☐ YES	☐ NO	☒ N/A

SECTION H - Permit Verification

INSPECTION OBSERVATIONS VERIFY THE PERMIT. ☒ YES ☐ NO ☐ N/A (Further explanation attached ______)

DETAILS:

(a) CORRECT NAME AND MAILING ADDRESS OF PERMITTEE.	☒ YES	☐ NO	☐ N/A
(b) FACILITY IS AS DESCRIBED IN PERMIT.	☒ YES	☐ NO	☐ N/A
(c) PRINCIPAL PRODUCT(S) AND PRODUCTION RATES CONFORM WITH THOSE SET FORTH IN PERMIT APPLICATION.	☒ YES	☐ NO	☐ N/A
(d) TREATMENT PROCESSES ARE AS DESCRIBED IN PERMIT APPLICATION.	☒ YES	☐ NO	☐ N/A
(e) NOTIFICATION GIVEN TO EPA/STATE OF NEW, DIFFERENT OR INCREASED DISCHARGES.	☒ YES	☐ NO	☐ N/A
(f) ACCURATE RECORDS OF RAW WATER VOLUME MAINTAINED.	☒ YES	☐ NO	☐ N/A
(g) NUMBER AND LOCATION OF DISCHARGE POINTS ARE AS DESCRIBED IN PERMIT.	☒ YES	☐ NO	☐ N/A
(h) CORRECT NAME AND LOCATION OF RECEIVING WATERS.	☒ YES	☐ NO	☐ N/A
(i) ALL DISCHARGES ARE PERMITTED.	☒ YES	☐ NO	☐ N/A

SECTION I - Operation and Maintenance

TREATMENT FACILITY PROPERLY OPERATED AND MAINTAINED. ☐ YES ☐ NO ☐ N/A (Further explanation attached ______)

DETAILS: Areator not operating -

(a) STANDBY POWER OR OTHER EQUIVALENT PROVISIONS PROVIDED.	☒ YES	☐ NO	☐ N/A
(b) ADEQUATE ALARM SYSTEM FOR POWER OR EQUIPMENT FAILURES AVAILABLE.	☒ YES	☐ NO	☐ N/A
(c) REPORTS ON ALTERNATE SOURCE OF POWER SENT TO EPA/STATE AS REQUIRED BY PERMIT.	☒ YES	☐ NO	☐ N/A
(d) SLUDGES AND SOLIDS ADEQUATELY DISPOSED.	☒ YES	☐ NO	☐ N/A
(e) ALL TREATMENT UNITS IN SERVICE. Areator not operating	☐ YES	☐ NO	☐ N/A
(f) CONSULTING ENGINEER RETAINED OR AVAILABLE FOR CONSULTATION ON OPERATION AND MAINTENANCE PROBLEMS.	☒ YES	☐ NO	☐ N/A
(g) QUALIFIED OPERATING STAFF PROVIDED.	☒ YES	☐ NO	☐ N/A
(h) ESTABLISHED PROCEDURES AVAILABLE FOR TRAINING NEW OPERATORS.	☒ YES	☐ NO	☐ N/A
(i) FILES MAINTAINED ON SPARE PARTS INVENTORY, MAJOR EQUIPMENT SPECIFICATIONS, AND PARTS AND EQUIPMENT SUPPLIERS.	☒ YES	☐ NO	☐ N/A
(j) INSTRUCTIONS FILES KEPT FOR OPERATION AND MAINTENANCE OF EACH ITEM OF MAJOR EQUIPMENT.	☒ YES	☐ NO	☐ N/A
(k) OPERATION AND MAINTENANCE MANUAL MAINTAINED.	☒ YES	☐ NO	☐ N/A
(l) SPCC PLAN AVAILABLE.	☐ YES	☐ NO	☐ N/A
(m) REGULATORY AGENCY NOTIFIED OF BY PASSING. (Dates ______ ______)	☒ YES	☐ NO	☐ N/A
(n) ANY BY-PASSING SINCE LAST INSPECTION.	☐ YES	☒ NO	☐ N/A
(o) ANY HYDRAULIC AND/OR ORGANIC OVERLOADS EXPERIENCED. Odor from lagoons	☐ YES	☐ NO	☐ N/A

PERMIT NO.
AR0036412

SECTION J - Compliance Schedules

PERMITTEE IS MEETING COMPLIANCE SCHEDULE. ☒ YES ☐ NO ☐ N/A (Further explanation attached ______)

CHECK APPROPRIATE PHASE(S).

- ☐ (a) THE PERMITTEE HAS OBTAINED THE NECESSARY APPROVALS FROM THE APPROPRIATE AUTHORITIES TO BEGIN CONSTRUCTION.
- ☐ (b) PROPER ARRANGEMENT HAS BEEN MADE FOR FINANCING (mortgage commitments, grants, etc.).
- ☐ (c) CONTRACTS FOR ENGINEERING SERVICES HAVE BEEN EXECUTED.
- ☐ (d) DESIGN PLANS AND SPECIFICATIONS HAVE BEEN COMPLETED.
- ☐ (e) CONSTRUCTION HAS COMMENCED.
- ☐ (f) CONSTRUCTION AND/OR EQUIPMENT ACQUISITION IS ON SCHEDULE.
- ☐ (g) CONSTRUCTION HAS BEEN COMPLETED.
- ☒ (h) START-UP HAS COMMENCED.
- ☐ (i) THE PERMITTEE HAS REQUESTED AN EXTENSION OF TIME.

SECTION K - Self-Monitoring Program

Part 1 – Flow measurement (Further explanation attached ______)

	YES	NO	N/A
PERMITTEE FLOW MEASUREMENT MEETS THE REQUIREMENTS AND INTENT OF THE PERMIT. DETAILS: Deficiency notice by EPA 79-7-24 - maintenance program on flow measurement equip [illegible]	☐	☐	☐
(a) PRIMARY MEASURING DEVICE PROPERLY INSTALLED [illegible]	☐	☐	☐
TYPE OF DEVICE: ☐ WEIR ☐ PARSHALL FLUME ☐ MAGMETER ☐ VENTURI METER ☐ OTHER (Specify Flowmeter)			
(b) CALIBRATION FREQUENCY ADEQUATE. (Date of last calibration ______ [illegible])	☐	☐	☐
(c) PRIMARY FLOW MEASURING DEVICE PROPERLY OPERATED AND MAINTAINED. [illegible]	☐	☐	☐
(d) SECONDARY INSTRUMENTS (totalizers, recorders, etc.) PROPERLY OPERATED AND MAINTAINED. [illegible]	☐	☐	☐
(e) FLOW MEASUREMENT EQUIPMENT ADEQUATE TO HANDLE EXPECTED RANGES OF FLOW RATES.	☒	☐	☐

Part 2 – Sampling (Further explanation attached ______)

	YES	NO	N/A
PERMITTEE SAMPLING MEETS THE REQUIREMENTS AND INTENT OF THE PERMIT. DETAILS:	☒	☐	☐
(a) LOCATIONS ADEQUATE FOR REPRESENTATIVE SAMPLES.	☒	☐	☐
(b) PARAMETERS AND SAMPLING FREQUENCY AGREE WITH PERMIT.	☒	☐	☐
(c) PERMITTEE IS USING METHOD OF SAMPLE COLLECTION REQUIRED BY PERMIT. IF NO, ☒ GRAB ☒ MANUAL COMPOSITE ☐ AUTOMATIC COMPOSITE FREQUENCY ______	☒	☐	☐
(d) SAMPLE COLLECTION PROCEDURES ARE ADEQUATE.	☒	☐	☐
(i) SAMPLES REFRIGERATED DURING COMPOSITING	☒	☐	☐
(ii) PROPER PRESERVATION TECHNIQUES USED	☒	☐	☐
(iii) FLOW PROPORTIONED SAMPLES OBTAINED WHERE REQUIRED BY PERMIT	☒	☐	☐
(iv) SAMPLE HOLDING TIMES PRIOR TO ANALYSES IN CONFORMANCE WITH 40 CFR 136.3	☒	☐	☐
(e) MONITORING AND ANALYSES BEING PERFORMED MORE FREQUENTLY THAN REQUIRED BY PERMIT.	☐	☐	☒
(f) IF (e) IS YES, RESULTS ARE REPORTED IN PERMITTEE'S SELF-MONITORING REPORT.	☐	☐	☒

Part 3 – Laboratory (Further explanation attached ______)

	YES	NO	N/A
PERMITTEES LABORATORY PROCEDURES MEET THE REQUIREMENTS AND INTENT OF THE PERMIT. DETAILS:	☒	☐	☐
(a) EPA APPROVED ANALYTICAL TESTING PROCEDURES USED. (40 CFR 136.3)	☒	☐	☒
(b) IF ALTERNATE ANALYTICAL PROCEDURES ARE USED, PROPER APPROVAL HAS BEEN OBTAINED.	☐	☒	☒
(c) PARAMETERS OTHER THAN THOSE REQUIRED BY THE PERMIT ARE ANALYZED.	☐	☒	☐
(d) SATISFACTORY CALIBRATION AND MAINTENANCE OF INSTRUMENTS AND EQUIPMENT.	☒	☐	☐
(e) QUALITY CONTROL PROCEDURES USED.	☒	☐	☐
(f) DUPLICATE SAMPLES ARE ANALYZED. ______ % OF TIME.	☒	☐	☐
(g) SPIKED SAMPLES ARE USED. ______ % OF TIME.	☒	☐	☐
(h) COMMERCIAL LABORATORY USED.	☐	☒	☐
(i) COMMERCIAL LABORATORY STATE CERTIFIED.	☐	☐	☒

LAB NAME ______

LAB ADDRESS ______

OMB No. 158-R0

PERMIT NO.

AR0036412

SECTION L - Effluent/Receiving Water Observations (Further explanation attached ____)

OUTFALL NO.	OIL SHEEN	GREASE	TURBIDITY	VISIBLE FOAM	VISIBLE FLOAT SOL	COLOR	OTHER

(Sections M and N: Complete as appropriate for sampling inspections)

SECTION M - Sampling Inspection Procedures and Observations (Further explanation attached ____)

- ☐ GRAB SAMPLES OBTAINED
- ☐ COMPOSITE OBTAINED
- ☐ FLOW PROPORTIONED SAMPLE
- ☐ AUTOMATIC SAMPLER USED
- ☐ SAMPLE SPLIT WITH PERMITTEE
- ☐ CHAIN OF CUSTODY EMPLOYED
- ☐ SAMPLE OBTAINED FROM FACILITY SAMPLING DEVICE

COMPOSITING FREQUENCY ____ PRESERVATION ____

SAMPLE REFRIGERATED DURING COMPOSITING: ☐ YES ☐ NO

SAMPLE REPRESENTATIVE OF VOLUME AND NATURE OF DISCHARGE ____

SECTION N - Analytical Results (Attach report if necessary)

CONSENT ADMINISTRATIVE ORDER
1986 DISCHARGES TO WASTEWATER TREATMENT SYSTEM

Several discharges into the biological treatment ponds occurred on the following dates in 1986: January 3, February 20, February 28, March 3, March 6, March 10, March 11, April 2, April 7, April 8, April 14, and April 18. These discharges consisted of propionic acid from the propanil process, which was being initially brought on line at the time. The discharges possessed the characteristic of corrosivity, with pH of less than 2.

As a result of these discharges (and other nonrelated issues), the Arkansas Department of Pollution Control and Ecology issue a notice of violation to Cedar Chemical Company on December 19, 1986. These allegations led to a Consent Administrative Order; the current CAO confirms that Cedar Chemical is in full compliance with the previous CAO.

Due to changes in management, Cedar Chemical is unable to locate data concerning these 1986 discharges into the biological treatment system. Should any such information be discovered, it will be submitted in a timely manner.

APPENDIX D
PREVIOUS SOIL INVESTIGATIONS

ECOLOGY AND ENVIRONMENT, INC.
INVESTIGATION OF INACTIVE PONDS

ECOLOGY AND ENVIRONMENT, INC.,

REGION VI

MEMORANDUM

TO: Keith Bradley, Region VI RPO

FROM: Miles Bolton, Ground Water Hydrologist MWB

THRU: K. H. Malone, Jr., Region VI RPM KHM

DATE: July 29, 1986

SUBJ: Sampling Mission Results from the Vertac-West Helena Site, West Helena, AR (AR 361) TDD# R06-8507-13

INTRODUCTION

FIT was tasked by the USEPA to conduct a sampling mission at the Vertac-West Helena site, West Helena, Arkansas, Figure 1. It was specifically requested that both surface and subsurface soil samples be collected at three inactive surface impoundments located along Vertac's northwestern boundary. It was agreed that three sample stations would be established for each impoundment area.

SITE DESCRIPTION AND HISTORY

On October 19, 1985, FIT members Miles Bolton, Weldon Day and Jeff Dubose met with site representative Joe Porter to discuss the following day's sampling mission and obtain additional site information. A summary of the site history follows:

A man named Kencade started operations at this site around 1970 manufactoring methoxychlor. At that time, ponds were present where the inactive surface impoundments are now located. In 1972 the chemical plant was sold to Jerry Williams who sold the plant to ANSEL later in 1972. In 1973 the plant was again purchased by Jerry Williams. By 1973 the plant was known as Eagle River Chemical. The name was later changed to Vertac, Inc. The predominant chemicals manufactured in the past were dinitro herbicide and propanil. The major chemicals currently being manufactured are methymil, permethrin, sypermethrin, and a hydrocarbon polymer that is composed of kerosine and I sonax 132. Mr. Porter claims that the yellow blocks scattered throughout the inactive portion of the site are where ANSEL buried dinitro drums.

Reviewed by EAW-SF date 8/5/86

The surface impoundments were created from the ponds around 1972-73. Limestone was added to the narrow impoundment for the acid neutralization of dichloromaline and proprionic acid. The other two ponds were used as waste disposal. Wash water from Helena Chemical's (AR 1589) chemical formulation operations was also placed into the ponds. Helena Chemical stopped disposing of their wastes in the ponds around 1976-77.

The ponds were closed in 1978. The closure procedure consisted of pumping the water from the pond (the water was removed by Rollins) and the placing a clay cap consisting of native soil and bentonite over the impoundments. An aerial photograph owned by Vertac indicates the narrow pond was approximately 2-4 feet deep and the other two ponds were approximately 5 to 10 feet deep.

SAMPLING RESULTS

Nine surface and nine subsurface samples were collected by FIT members Miles Bolton, Weldon Day, Jeff Dubose, Thomas Lensing and Lloyd Collins on October 20, 1985. Their locations are shown in Figure 3. The subsurface samples were collected using post hole diggers. Since the maximum depth obtainable with post hold diggers is about 5 feet, the samples were collected along the sides of the ponds to ensure penetrating the fill material used to cover the ponds. In all cases, the subsurface soil samples were collected after a lithologic change in the soil profile was evident, indicating the subsurface samples consisted of non-fill material.

Organic and inorganic laboratory results, field sample documents and photographs are attached to this report. The sample stations were lettered A through I. The number 1 was added as a suffix to each letter to indicate surface samples and the number 2 was added to indicate subsurface samples. Note in the laboratory results that organic samples from Stations D1, G-2, H1 and I2 had to be analyzed as medium conentration samples by the laboratory. Table 1 summarizes the organic surface sample results and Table 2 summarizes the organic subsurface sample results. These tables do not list any compounds that were flagged as being present in laboratory blanks, tentatively identified, or below detection limits. Therefore, only those compounds positively identified as being present in the samples are listed.

The organic sample results indicate that the surface fill material for pond #1 is more contaminated than the subsurface material, especially at Station B. The opposite is true for ponds 2 and 3. Only pesticides were positively identified in the subsurface samples.

In contrast to the organic results, the inorganic sample results do not indicate the presence of significant inorganic contamination. The lack of a background sample, however, makes it difficult to draw definite conclusions.

CONCLUSIONS AND RECOMMENDATIONS

It is evident from the sample results that the subsurface material is contaminated with pesticides and other organic compounds and the surface fill material is contaminated with pesticides. Since the surface fill material is contaminated with a variety of pesticides, the possibility that the contamination extends beyond the site boundaries should be considered.

Considering the area's dependence upon ground water, the FIT recommends that monitoring wells be installed around the ponds to determine if the ground water has been affected by the organic compounds. The proposed well locations are shown in Figure 4. These locations would provide water quality and local hydraulic gradient information. Currently, FIT lacks local hydrogeologic information for the area around the site. Therefore, the specific design of the wells will be dependent upon the acquisition of additional hydrogeologic information.

If the EPA desires to determine whether or not the surface soil contamination extends beyond the fill material as a result of wind blown action or possible indiscriminate dumping, then the FIT recommends that surface soil samples be collected outside of the pond area. The proposed locations are shown in the attached aerial photograph, Figure 5. Each sample would be a composite consisting of soil collected at the station and four other locations no more than 10 feet from the station. Based upon these results, a comprehensive sampling plan could be developed to accurately determine the extent of surface pesticide contamination.

Table 1. Organic surface soil results from the Vertac-West Helena site (AR 361). Only results that were not flagged are shown. Concentrations are in parts per billion.

Station	A1	B1	C1	D1	E1	F1	G1	H1	I1
4,4'-DDT		1,813	26		30	34	25		
Methoxychlor	3,984	12,996	241			184	817	221	444
Aldrin		596.1						37	
Dieldrin		1,120							
Chlordane		3,563							
4,4'-DDE		421							

Table 2. Organic surface soil results from the Vertac-West Helena site (AR 361). Only results that were not flagged are shown. Concentrations are in parts per billion.

Station	A2	B2	C2	D2	E2	F2	G2	H2	I2
4,4'-DDT			22						
Methoxychlor	216			85,121		5,659	17,266		654,178
Aldrin						1,073.6			
Chlordane						14,360			
1,2 Dichloroethane					190				
Phenol				1,800	840		3,100		
Bis(2-ethyl hexyl) phthalate		670	2900						
1,2-dichlorobenzene									30,000
Gamma-BHC				72.2	98.3				4,980
Toluene							4,000	34,000	16,000
Ethylbenzene									28,000
Chlorobenzene									2,600
Total xylenes							1,700	3,300	180,000
2-hexanone								75,000	75,000

QA/QC

After reviewing the data obtained from samples taken at the Vertac-West Helena facility the results are as follows:

In the inorganic analysis the spike recoveries for antimony (55%), lead (65%), selenium (0%), silver (60%), tin (17%), manganese (34%) and arsenic (70%) were below QC limits. Any values reported for these metals may be biased to the low side, and actual values may be higher than reported values.

The duplicate analysis for calcium should be used cautiously. All other analysis for inorganics were satisfactory.

For the organic analyss the surrogate recoveries for samples FC284, FC285, FC286 and FC287 were outside of QC limits. These four samples were reextracted and reanalyzed, however the reanalysis was worse than the original analysis so the results from the original analysis was reported. Since the surrogates were out of QC limits both times, this may represent a real matrix interference in the samples and not a lab problem.

For sample FC291 the % RPD for the volatiles were all outside QC limits. Since this was a field rinsate blank the effect was probably minimal.

For sample FC280 the % surrogate recoveries for all fractions were slightly above QC limits. Values reported for this sample may be higher than actual values.

All compounds found in the lab blank were flagged with a B.

The tuning and calibration analysis for these samples were satisfactory.

The analysis of these samples show that each location had a variety of pesticides at varying concentrations.

INORGANIC SOIL ANALYSIS SUMMARY

ASE NUMBER: 4781
ITE NAME/CODE: Vertac, W. Helena AR 361 ..

CONCENTRATIONS (ppm)

ARAMETER	MFB341	MFB350	MFB342	MFB351	MBF343	MFB354	MFB344	MFB355	MFB345	MFB356	MFB346	AMBIENT BACKGROUND 1. Western U.S. 2.	Eastern U.S. 2.
	EPA Sample Numbers												
trix type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	Soil	Soil
uminum	3570	3690	3710	2760	3320	3240	2870	2750	5330	6920	3000	58,000	33,000
timony								28R				.47	.52
senic	11R	6.3R	16R	4R	6.9R	7.8R	20R	2.2R	7.2R	9.9R	4.6R	5.5	4.8
rium	111	84	144	110	90	87	109	68	118	122	88	580	290
ryllium												0.68	0.55
d ium												1	1
ium	13,100*	6650*	4700*	21,500*	15,200*	23,900*	16,100*	217,000*	8610*	1470*	11,900*	18,000	3,200
romium			5.2					5.4				41	33
balt												7.1	5.9
pper	12	8	6.1	7.5	8.2	7.6	7	4.3	6.9	9.9	6.2	21	13
on	10,500	10,400	8160	9530	9880	10,400	9250	5330	11,400	12,200	8670	21,000	14,000
ad	7.8R	7.3R	9.4R	5.9R	7.4R	6.8R	6.3R	3.3R	7.7R	3.5R	7.2R	17	14
gnesium	6850	3950	2390	11,700	8550	12,500	8850	12,300	5190	1360	6780	7,800	2,300
nganese	627R	444R	640R	500R	636R	579R	661R	459R	582R	515R	519R	380	260
rcury	0.081	0.038	0.095	0.067	0.079	0.050	0.057	0.019	0.048	0.083	0.067	0.046	0.081
ckel												15	11
tassium	483		490	2.91					328	788	379		
lenium												.23	.30
lver												-	-
lium	542	485	469	712	388	502	566	734	650	822	465	10,000	2,600
allium												9.1	7.7
												.90	.96
ium												70	43
nc	40	32	27	32	38	37	34	31	36	34	33	55	40
anide			0.54R		0.52R				0.53R	1.4R	0.60R		
ation No.	A1	A2	B1	B2	C1	C2	D1	D2	E1	E2	F1		
mple ation cation	INACTIVE IMPOUND-MENT, NORTH POND	INACTIVE IMPOUND-MENT, NORTH POND (SUB-SURFACE)	INACTIVE IMPOUND-MENT, NORTH POND	INACTIVE IMPOUND-MENT, NORTH POND (SUB-SURFACE)	INACTIVE IMPOUND-MENT, NORTH POND	INACTIVE IMPOUND-MENT, NORTH POND (SUB-SURFACE)	INACTIVE IMPOUND-MENT, SOUTH POND	INACTIVE IMPOUND-MENT, SOUTH POND (SUB-SURFACE)	INACTIVE IMPOUND-MENT, SOUTH POND	INACTIVE IMPOUND-MENT, SOUTH POND (SUB-SURFACE)	INACTIVE IMPOUND-MENT, SOUTH POND		

ndicates a value estimated or not reported due to the presence of interference.
spike sample recovery is not within control limits.
duplicate analysis is not within control limits.

1. Values obtained fr "Element Concentrations Soils and Other Surface Materials of the Conter minous United States", dated 1984. U.S.G.S. Professional Paper 1270
2. Reference for East/ West Division is the 96 W longitudinal line which bisects Region VI
10/31/85

ASE NUMBER: /81
ITE NAME/CODE: Vertac, W. Helena AR 361

CONCENTRATIONS (ppm)

RAMETER	EPA Sample Numbers											AMBIENT BACKGROUND 1	
	MFB357	MFB347	MFB358	MFB348	MFB359	MFB349	MFB360					Western U.S. 2.	Eastern U.S. 2.
trix type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL					Soil	Soil
uminum	4240	4020	3780	2830	4180	3640	2910					58,000	33,000
timony												.47	.52
senic	6.6R	6.0R	58R	4.9R	7.6R	5.9R	32R					5.5	4.8
rium	103	110	117	116	79	117	70					580	290
ryllium												0.68	0.55
um												1	1
ium	13,500*	11,100*	2310*	25,100*	50,500*	22,300*	96,200*					18,000	3,200
romium	7.9	5.1		128	8.5	7.3	6.2					41	33
balt												7.1	5.9
pper	11	8.5	11	9.9	9.4	12						21	13
on	9970	10,800	9350	10,500	8430	11800	5680					21,000	14,000
ad	6.1R	8.5R	9.2R	6.4R	5.1R	6.9R	4.8R					17	14
gnesium	7320	5940	1390	13,500	6700	11,700	3720					7,800	2,300
nganese	439R	594R	342R	650R	274R	702R	482R					380	260
rcury	0.070	0.063	0.075	0.045	0.084	0.070	0.042					0.046	0.081
ckel	10			34		11						15	11
tassium	823	277	736		975		453						
lenium												.23	.30
lver												-	-
dium	627	628	568	597	594	642	532					10,000	2,600
allium												9.1	7.7
n												.90	.96
ium	16					16						70	43
nc	39	37	31	38	38	46	17					55	40
anide			0.56R										
ation No.	F2	G1	G2	H1	H2	I1	I2						
mple ation cation	INACTIVE IMPOUND-MENT, SOUTH POND (SUB-SURFACE)	INACTIVE IMPOUND-MENT, WEST POND	INACTIVE IMPOUND-MENT, WEST POND (SUB-SURFACE)	INACTIVE IMPOUND-MENT WEST POND	INACTIVE IMPOUND-MENT, WEST POND. (SUB-SURFACE)	INACTIVE IMPOUND-MENT, WEST POND	INACTIVE IMPOUND-MENT, WEST POND (SUB-SURFACE)						

1. Values obtained fr "Element Concentrations Soils and Other Surface Materials of the Conter minous United States", dated 1984. U.S.G.S. Professional Paper 1270

2. Reference for East/West Division is the 96 W longitudinal line which bisects Region VI

ndicates a value estimated or not reported due to the presence of interference.
pike sample recovery is not within control limits.
uplicate analysis is not within control limits.

10/31/85

ITE NAME/CC Vertac, W Helena AR 361

CONCENTRATIONS (ppb)

ARAMETER	EPA Sample Numbers											Drinking Water Criter	
	MFB352	MFB353	MFB361									Primary	Seconc
trix type	WATER	WATER	WATER										
uminum													
timony													
senic												50	
rium												1000	
ryllium													
dmium												10	
lcium	144*	168*	156*										
ium												50	
balt													
pper													1000
on													300
ad												50	
gnesium													
nganese													50
rcury	0.052	0.032	0.041									2	
ckel													
tassium													
lenium												10	
lver												50	
dium	217	222	217										
allium													
n													
nadium													
													5000
anide													
tion No.													
mple tion cation	RINSATE BLANK	RINSATE BLANK	RINSATE BLANK										

ndicates a value estimated or not reported due to the presence of interference.
pike sample recovery is not withing control limits.
uplicate analysis is not within control limits.

Table II: ORGANIC ANA[illegible]SIS SUMMARY

Site Name/Code Vertac, W. Helena AR 0361 Case [illegible]r 4781 Concentration ppb Page 1 of 1

Sample Station Number and Location / Compound	Scan No.	Fraction /Class	RINSATE BLANK 8/20/85	RINSATE BLANK 8/20/85	RINSATE BLANK 8/21/85
EPA SAMPLE NUMBER			FC291	FC292	FC300
MATRIX			WATER	WATER	WATER
Methylene Chloride		VOA/1	5B		5B
Chloroform		VOA/1	5B		5B
Benzene		VOA/1	5B		
Bis-(2-ethylhexyl) phthalate		ABN/1	20JB	20JB	220B
Oxirane		VOA/3	9J		
Hexamethylcyclotrisiloxane		VOA/3	62JB		41JB
Acetone		VOA/2			950B
Di-n-octyl phthalate		ABN/1			20J
Methoxychlor		Pest/1			0.69
Unknown	2042	ABN/3			18J
Unknown	2056	ABN/3			27J
Unknown	2081	ABN/3			12J

1. Priority Pollutant.
2. Specified Hazardous Substance.
3. Tentatively Identified.

VOA - Volatile
ABN - Acid Base/Neutral
Pest - Pesticide

B - The analyte is found in the lab blank.
J - Indicates an estimated value for tentatively identified compounds compounds found below detection limit.
P - Present in sample, but not reported by lab.

Table II: ORGANIC ANALYSIS SUMMARY

Site Name/Code Vertac, W Helena AR 0361 Case Number 4781 Concentration ppb Page 1 of 4

Sample Station Number and Location / Compound	Scan No.	Fraction /Class	A1	A2	B1	B2	C1	C2	D1	D2	E1	E2	F1	F2
EPA SAMPLE NUMBER			FC280	FC289	FC281	FC290	FC282	FC293	FC283	FC294	FC284	FC295	FC285	FC296
MATRIX			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	16B	SOIL
Methylene Chloride		VOA/1	9B	10B	12B	22B	9B	17B	840B	36B	21B	150B	6B	16B
Chloroform		VOA/1	7B	7B	6B	7B	7B	7B	840B		6B	110B		7B
Benzene		VOA/1	7B		7B				840B	6B	6B			
Toluene		VOA/1									6J			
1,1,1- trichloroethane		VOA/1		7J		7J								
~~1,2-dichloroethane~~		VOA/1										190		
Ethylbenzene		VOA/1												
Chlorobenzene		VOA/1												
Acetone		VOA/2				14B		13B	150B		12B		12B	12B
Total xylenes		VOA/2												
2-hexanone		VOA/2												
N-nitrosodiphenylamine		ABN/1	459J			465J	465J	436J		405J		475J		2078J
Phenol		ABN/1								1800		840		
1,2-dichlorobenzene		ABN/1								405J				
Bis-(2-ethyhexyl) phthalate		ABN/1				670		2900		405J		475J		
4,4-DDT		Pest/1			1813		26	22			30		34	
4,4-DDE		Pest/1			421									
Methoxychlor		Pest/1	3984	216	12,996		241	104.6J	106.8J	35,121	99.6J	114J	184	5659
Aldrin		Pest/1			596.1									1073.6
Dieldrin		Pest/1			1120			20.9J				22.8J		
Chlordane		Pest/1			3563									14,360
Gamma-BHC (lindane)		Pest/1								22.2		98.3		
Hexamethylcyclotrisiloxane		VOA/3	92JB	31JB	340JB	30JB	74JB	34JB	1500JB	190JB	280JB		36JB	20JB
Methoxybenzene		VOA/3					9J			1100J				13J
Unknown	62	VOA/3							1600J					
Unknown Alkane	247	VOA/3								400J				
Unknown Alkane	263	VOA/3								34J				
Unknown Alkane	441	VOA/3								9J				
1,2-dichloro-3-nitrobenzene		ABN/3												
Unknown Alkane	1510	ABN/3	590J				420J					380J	650J	
Unk. carboxylic acid	1518	ABN/3	390J				960J						450J	
Unk. polynuclear aromatic	1937	ABN/3	1000J											
Unknown Alkane	2222	ABN/3	1100J						280J				460J	
Unknown Alcohol	530	ABN/3		230J				280J				390J		
Unknown Amine	1798	ABN/3		230J				330J			300J		720J	
Unknown	1842	ABN/3		290J	2600J			1100J						
Unknown	508	ABN/3			2100J									
Unknown Ketone	1684	ABN/3			2500J		1100J							
Unknown Alkane	1677	ABN/3				260J						580J	560J	
Unknown	2394	ABN/3					810J					1400J	930J	
Unk. Subsituted Benzene	401	ABN/3								1300J			240J	
Unknown Alkane	1025	ABN/3								480J				
Unknown Alkane	1218	ABN/3								510J				
Unknown Amine	1456	ABN/3								1000J				
Unknown	1580	ABN/3								1100J				1700J
Unk. Carboxylic Acid	1364	ABN/3										340J		
Unknown Alkane	1941	ABN/3											1700J	

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2. Specified Hazardous Substance.
3. Tentatively Identified.

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Pest - Pesticide

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Table II: ORGANIC ANALYSIS SUMMARY

Site Name/Code Vertac, W. Helena AR 0361 Case Number 4781 Concentration ppb Page 2 of 4

Sample Station Number and Location / Compound	Scan No.	Fraction /Class	A1	A2	B1	B2	C1	C2	D1	D2	E1	E2	F1	F2
EPA SAMPLE NUMBER			FC280	FC289	FC281	FC290	FC282	FC293	FC283	FC294	FØ84	FC295	FC285	FC296
MATRIX			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Unknown	1993	ABN/3											430J	
Unknown Alkane	2002	ABN/3											250J	
Unknown	2320	ABN/3											700J	
Unknown	2345	ABN/3											510J	
Unknown	1526	ABN/3												1800J
Unknown	1544	ABN/3												1100J
Unknown Alcohol	1558	ABN/3												1100J
Unk. CArboxylic Acid	1752	ABN/3												1900J
Unknown	1403	ABN/3												
Unk. Substituted Benzene	1412	ABN/3												

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Table II: ORGANIC ANALYSIS SUMMARY

Site Name/Code Vertac, W. Helena AR 0361 Case Number 4781 Concentration pp b Page 3 of 4

Sample Station Number and Location / Compound	Scan No.	Fraction /Class	G1	G2	H1	H2	I1	I2
EPA SAMPLE NUMBER			FC286	FC297	FC287	FC298	FC288	FC299
MATRIX			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Methylene Chloride		VOA/1	15B	2700B	2300B	3300B	17B	1710B
Chloroform		VOA/1	7B	845B	790B		7B	1710B
Benzene		VOA/1	7B	845B				1710B
Toluene		VOA/1		4000	790J	34,000		16,000
1,1,1-trichloroethane		VOA/1					7J	
1,2-dichloroethane		VOA/1						
Ethylbenzene		VOA/1		845J		1600J		28,000
Chlorobenzene		VOA/1						2600
Acetone		VOA/2	13B	5200B	4600B		42B	
Total xylenes		VOA/2		1700		3300		180,000
2-hexanone		VOA/2				75,000		75,000
N-nitrosodiphenylamine		ABN/1	444J	2254J				13,680J
Phenol		ABN/1		3100				
1,2-dichlorobenzene		ABN/1		2254J				30,000
Bis(2-ethylhexyl) phthalate		ABN/1					440J	
4,4-DDT		Pest/1	25				21.3J	
4,4-DDE		Pest/1						
Methoxychlor		Pest/1	817	17,266	221		444	654,178
Aldrin		Pest/1			37			
Dieldrin		Pest/1						
Chlordane		Pest/1						
Gamma- BHC (lindane)		Pest/1						4980
Hexamethycyclotrisilaxane		VOA/3	85JB	520JB	930JB	1000JB	860JB	46JB
Methoxybenzene		VOA/3		28,000J		200,000J		140,000J
Unknown	62	VOA/3		850J	2000J			2000J
Unknown Alkane	247	VOA/3						
Unknown Alkane	263	VOA/3						
Unknown Alkane	441	VOA/3						
1,2-dichlaro-3-nitrobenzene		ABN/3		15,000J				740,000J
Unknown Alkane	1510	ABN/3						
Unk. carboxylic acid	1518	ABN/3						
Unk. polynuclear aromatic	1937	ABN/3						
Unknown Alkane	2222	ABN/3						
Unknown Alcohol	530	ABN/3					310J	
Unknown Amine	1798	ABN/3	250J				740J	
Unknown	1842	ABN/3	270J	1900J			230J	
Unknown	508	ABN/3						
Unknown Ketone	1684	ABN/3						
Unknown Alkane	1677	ABN/3						
Unknown	2394	ABN/3						
Unk. Substituted Benzene	401	ABN/3		3300J			380J	56,000J
Unknown Alkane	1025	ABN/3		1900J				71,000J
Unknown Alkane	1218	ABN/3						
Unknown Amine	1456	ABN/3		2200J				24,000J
Unknown	1580	ABN/3						
Unk. Carboxylic Acid	1364	ABN/3						
Unknown Alkane	1941	ABN/3						

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Table II: ORGANIC ANALYSIS SUMMARY

Site Name/Code Vertac W. Helena AR 361 Case Number 4781 Concentration ppb

Sample Station Number and Location / Compound	Scan No.	Fraction /Class	G1	G2	H1	H2	I1	I2						
PA SAMPLE NUMBER														
ATRIX														
Unknown	1993	ABN/3												
Jnknown Alkane	2002	ABN/3												
Jnknown	2320	ABN/3												
Jnknown	2345	ABN/3												
Jn[illegible]own	1526	ABN/3												
[illegible]wn	1544	ABN/3												
Jnknown Alcohol	1558	ABN/3												
Jnk. Carboxylic Acid	1752	ABN/3												
Jnknown	1403	ABN/3	1900J	1200J				45,000J						
Jnk. Substituted Benzene	1412	ABN/3			2700J		7700J							

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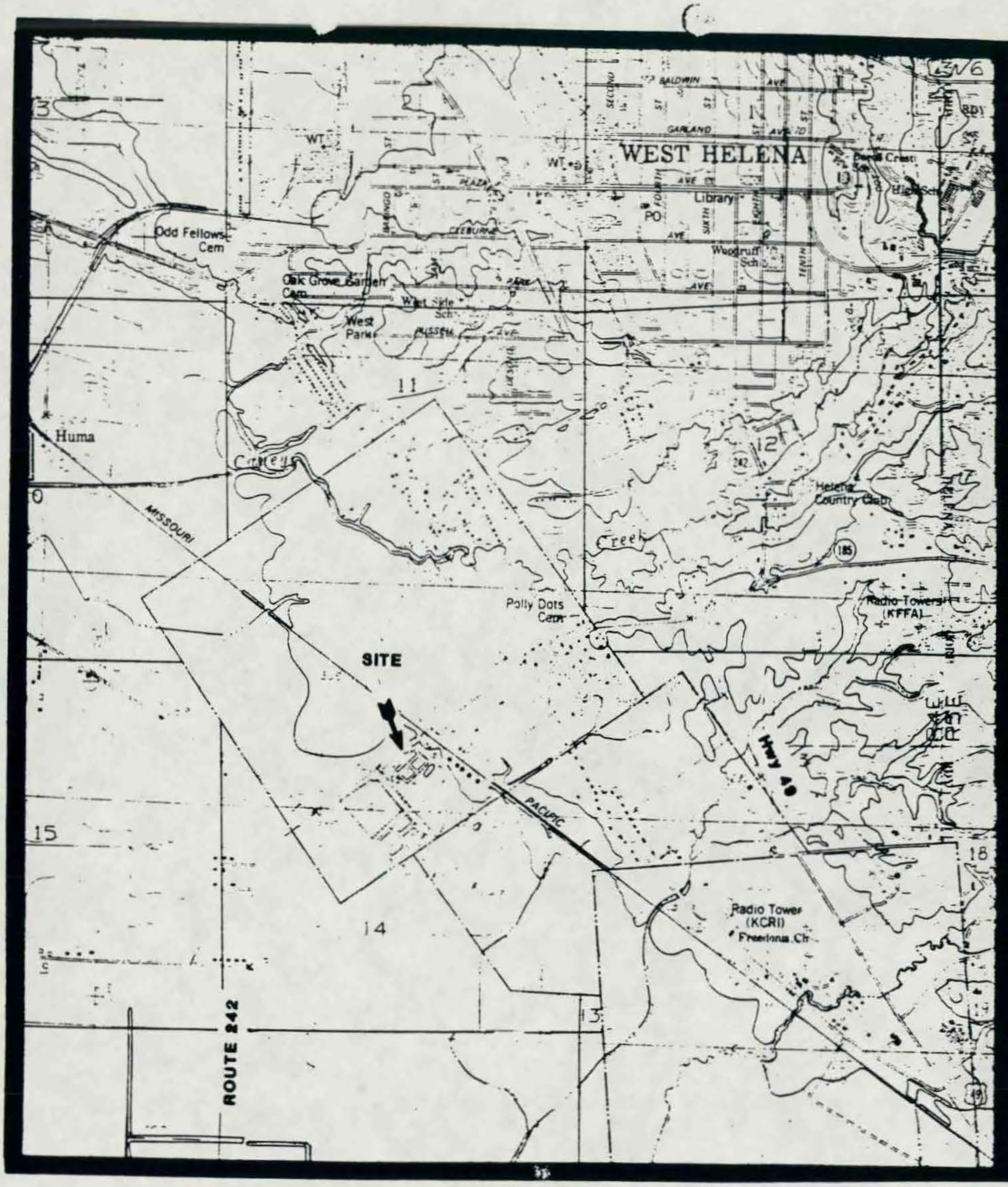


Figure 1. Site location map for the Vertac-West Helena site in West Helena, Arkansas (AR 361).

Scale: 1 inch ≈ 2,000 Ft.

N

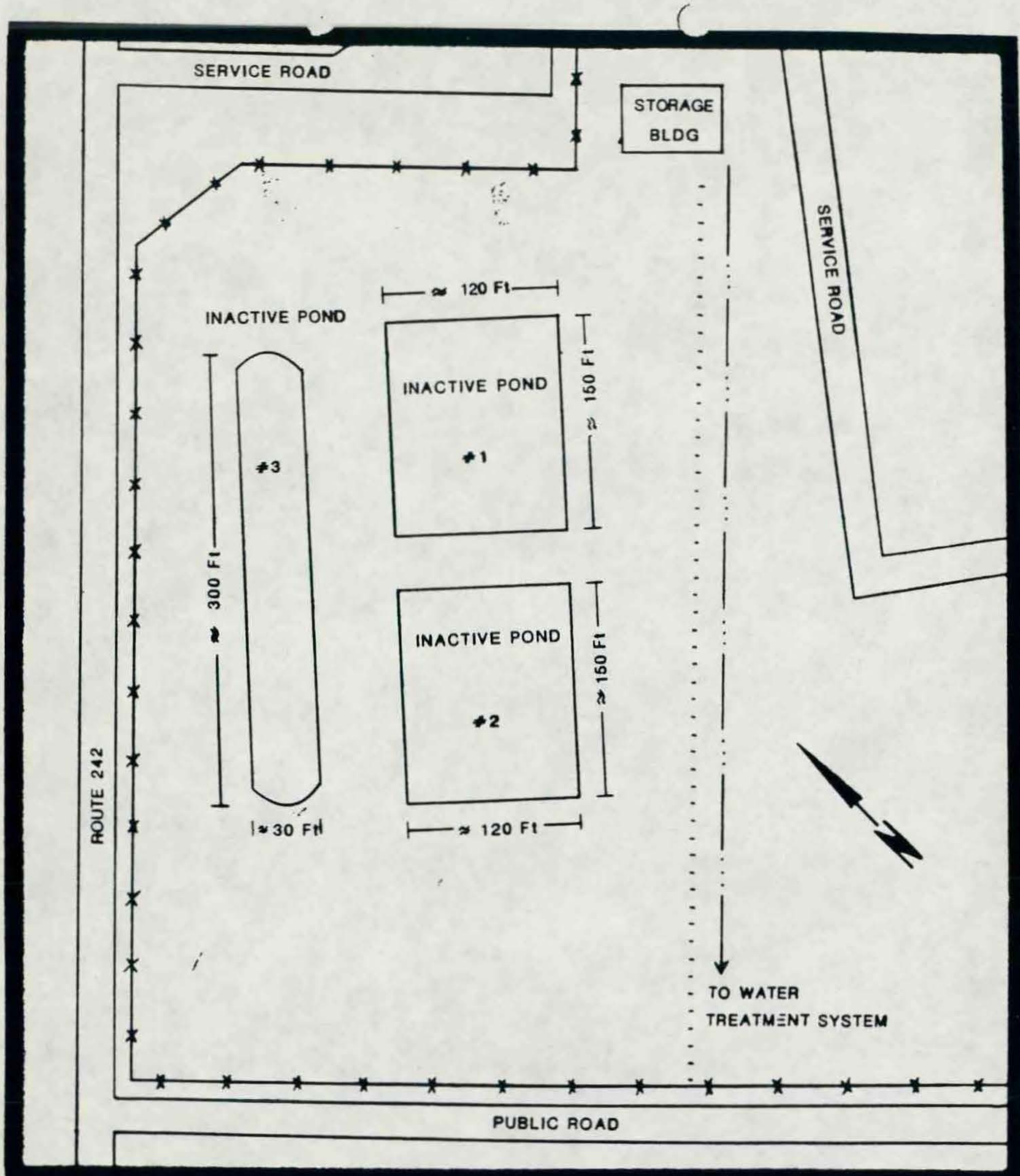


Figure 2. Site sketch of the inactive ponds located at the Vertac-West Helena site (AR 361). The pond boundaries and dimensions are estimates.

Berm

Open culvert

Fence

Not drawn to scale

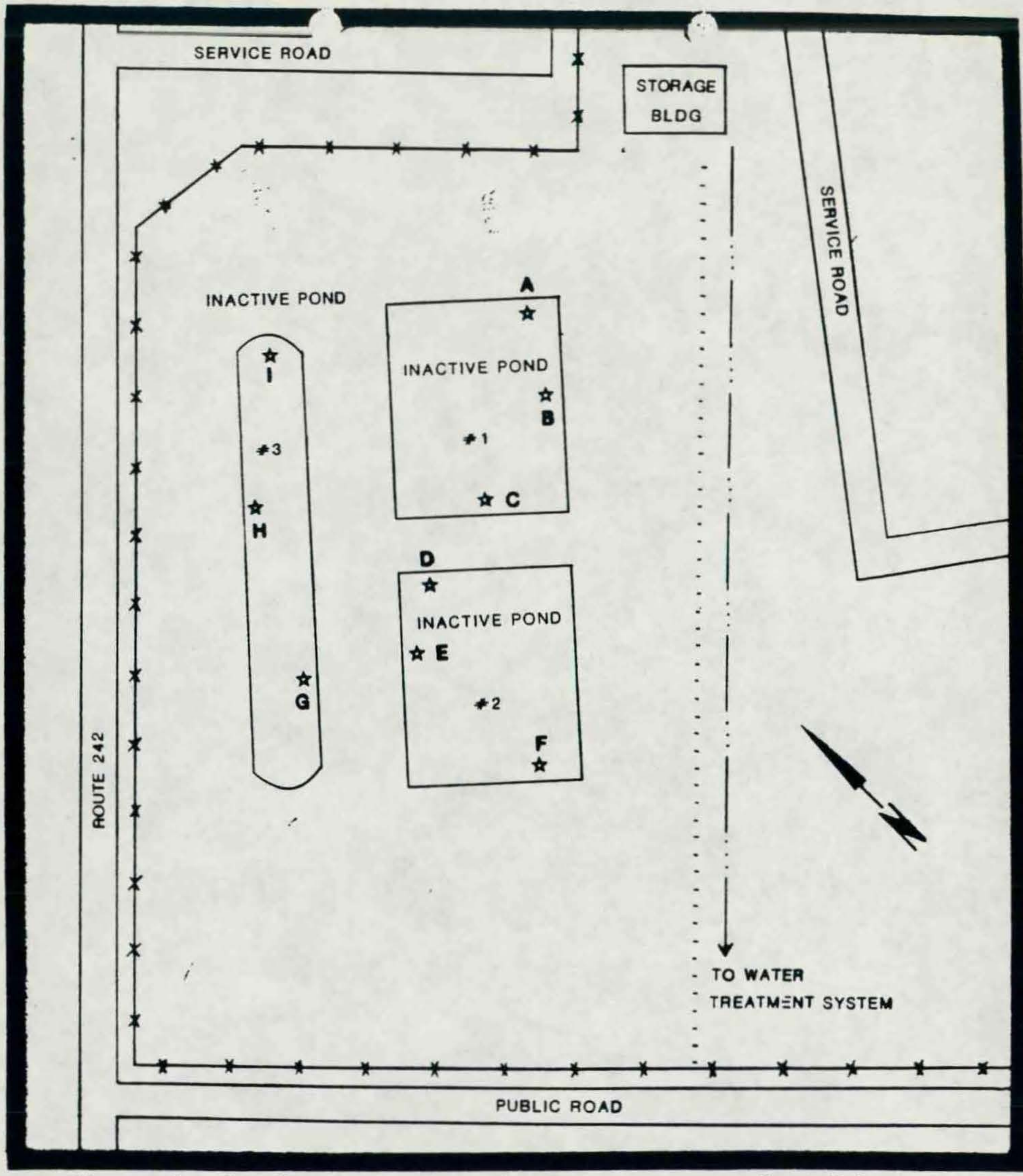


Figure 3. Sample station locations at the Vertac-West Helena site (AR 361).

☆ Sample stations

Fence

Berm

Open culvert

Not drawn to scale

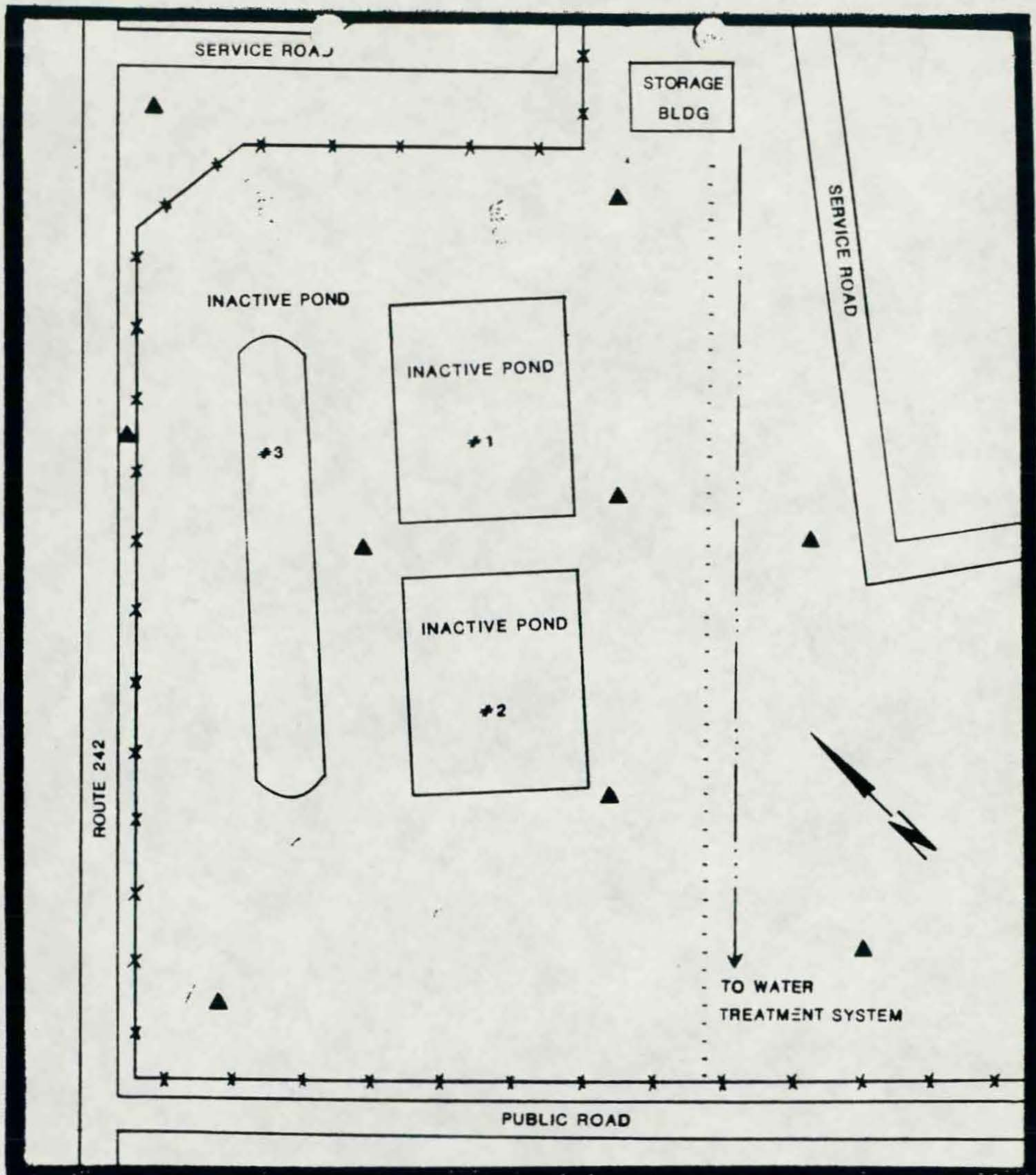


Figure 4. Proposed monitoring well locations for the Vertac-West Helena site (AR 361).

▲ Well locations

Fence

Berm

Open culvert

Not drawn to scale

SURFACE IMPOUNDMENT SAMPLING AND ANALYSIS REPORT

SURFACE IMPOUNDMENT SAMPLING AND ANALYSIS REPORT

MARCH 14, 1988

PREPARED FOR

CEDAR CHEMICAL CORPORATION

BY

SORRELLS RESEARCH ASSOCIATES, INC.
8002 STANTON ROAD
LITTLE ROCK ARKANSAS 72209

CHEMISTS
ECOLOGISTS
CONSULTANTS
PLANNERS

SORRELLS RESEARCH
LABORATORY AND FIELD SERVICES

WPCF

8002 STANTON ROAD
LITTLE ROCK, ARKANSAS 72209

(501) 562-8139

April 21, 1988

Mr. Joe Porter, Environmental Engineer
Cedar Chemical Corporation
P.O. Box 2749
West Helena AR 72390

RE: Surface Impoundment Sampling and Analysis

Dear Mr. Porter:

Enclosed please find addendum .1, .2 , revision page, page 25a along with maintenance information for the Cedar Chemical Project.

Replace the revision page and insert other pages (11.1, 11.2) following page 11 of your Project Report.

Insert page 25a following page 25 in our Quality Assurance Plan and add the appendices Preventive Maintenance information following the end of the QAP.

It has been a pleasure to work with you on this project.

Yours truly,

K. E. Sorrells

K. E. Sorrells, M.S., Consulting Chemist

President, Sorrells Research Associates, Inc.

AW01.4

KES/lsm

enclosures

TABLE OF CONTENTS

SCOPE OF PROJECT

Cedar Chemical Corporation at West Helena, Arkansas operates a biological treatment system consisting of three surface impoundments operated in series with respect to flow.

This project was designed to sample and analyze all sludges, sediments, and liquids in the biological treatment system and to make a determination pursuant to 40 CFR Part 262.11 whether such materials are hazardous wastes.

Sampling and analysis was carried out by Sorrells Research Associates, Inc. as reported herein.

TABLE I - ANALYTICAL PARAMETERS

GENERAL PARAMETERS	METALS
Alkalinity	Aluminum
Flashpoint	Cadmium
COD	Chromium
Total Solids	Lead
Total Suspended Solids	Mercury

GENERAL PARAMETERS (continued)

Total Volatile Solids
Ammonia-Nitrogen
Nitrate-Nitrogen
Sulfate

Sulfide
Sulfite
Cyanide
Chloride
Arsenic

Phosphorus, Total
Total Organic Carbon
Total Organic Halogen

Field Temperature
Field pH

ORGANIC

Ethylene Dichloride

Methyl Isobutyl Ketone
Mesityl Oxide
Toluene
Xylene

Isophorone
Dimethyl Acetamide

3,4-Dichloroaniline
Propanil

Phenol(s)

PERSONNEL - SORRELLS RESEARCH
FIELD SUPERVISOR - C. A. SORRELLS
FIELD BIOLOGIST - M. G. MARTIN
CONSULTING CHEMIST - K. E. SORRELLS

OBSERVERS - CEDAR CHEMICAL CORPORATION
ENVIRONMENTAL ENGINEER - JOE E. PORTER
LICENSED OPERATOR / ENVIRONMENTAL ANALYST - DALE KUMMER

SAMPLING PROCEDURES

SAMPLING PLAN

A. Field Planning

As previously stated, the biological treatment system consists of three surface impoundments operated in series with respect to flow. The initial pond, known herein as the equalization pond receives influent from the plant area through an API separator.

The effluent point lies at almost maximum distance obtainable diagonally. Therefore, four bottom samples points, 1 through 4, at approximately even intervals between the influent and the effluent were selected to represent gradient of influent contamination.

This pond has a retention time of approximately two months. One sample point at the exit point was selected to adequately represent the pond's contents, Point No.5.

Point No. 5 was selected for field replicate sampling, and for split sampling with Cedar Chemical Corporation.

The aeration basin operation design is that of a complete mix system. An aqueous sample representing the mix, Point No. 6, and a return sludge sample, No. 7, were selected to adequately represent the physical and chemical content of the extended aeration basin.

The Polish Pond is the final impoundment prior to discharge to the Mississippi River. Entry and exit points are almost diagonally opposite in the rectangular impoundment. A bottom Sample Point, No. 8, from the entry side was selected to indicate settled solids from the clarifier overflow. Bottom Sample Point No. 9 close to the exit was selected to most closely indicate that contacting effluent to the river.

Point No. 9 was selected for field replicate sampling for bottom sediment samples.

B. Field Equipment. (See Method Documention Section for Laboratory Equipment.)

SPECIAL COLLECTION REQUIREMENTS

1. Bottom samples were collected using 12 feet length, 1" diameter PVC pipe in extension sections. A detachable rectangular open-mouth container attached to the end was used to collect bottom sediments, and, after thorough rinsing, water samples.

FIELD MEASUREMENTS

2. A YSI Model 35 Meter was used to measure conductivity, as well as sample temperature.

   A Cole-Parmer Model 5850 pH/Ion/Temp Meter was used to measure sample pH.

CONTAINERS AND PRESERVATION

3. For GLC extractables samples, the Wheaton Amber Borosilicate glass liter bottles with teflon-liner caps were used.

   I-Chem Research EPA protocol 40-ml, septum-capped vials were used to collect duplicate samples for GLC purgeables.

   Samples for TOC were collected in 4 oz amber borosilicate glass bottles with septum-lined caps.

B. Field Equipment. (See Method Documention Section for Laboratory Equipment.)

(Continued from preceding page)

Bottom sediment samples were collected in the corresponding (as cited here) wide-mouth container in every case.

The Nalgene LPE 500 ml and/or 1000 ml containers were used for samples for metals analysis, and preserved with nitric acid to pH less than 2.

Samples for cyanide analysis were collected in Nalgene 500 ml or 1000 ml bottles and preserved with NaOH to pH greater than 12, and cooled to 4 .C with crushed ice.

Water samples for solids and other inorganic analysis such as sulfate and chloride were collected in half-gallon polyethylene bottles.

SAMPLE TAGGING AND CHAIN OF CUSTODY

4. Waterproof tags or labels for sample marking. These were made out by C. A. Sorrells, as he kept the permanent field log, and fastened securely to each sample container, as the samples were collected and preserved.

SAMPLING PLAN

Section C

C. Sampling Procedure: A minimum number of trained persons are to be involved in sample collection and handling. For this project, the samplers were K. E. Sorrells, M. S., C. A. Sorrells, and M. G. Martin. Observers were J. E. Porter and Dale Kummer.

1. Distances along the ponds edges were measured for representative sampling points. These were selected by K. E. Sorrells, determined by pacing.

2. Bottom samples were collected by M. G. Martin using a 12 foot length, 1" diameter PVC pipe as an extension, with a rectangular open-mouth container attached to the end, in order to scrape up the bottom sediments. Bottom samples were collected from the equalization pond and from the final pond. These are rectangular in shape, with sloping sides, a total depth of 6 to 8 feet, and considerable freeboard. Bottom sample depths were approximately 4 feet.

3. The sampling device was rinsed before and after each sample was taken, per Quality Assurance/Quality Control (QA/QC) procedures, Section 6, Paragraph D, Sorrells Research Associates Quality Assurance plan (submitted as an attachment. (SRA QAP).

   Bottom sediments from successive scrapings at a sample point were combined and gently mixed in order to insure both the homogeneity and the integrity of the sample. This was accomplished by K. E. Sorrells, who also filled EPA vials for volatiles analysis.

4. Field duplicates were taken for two of the nine sites, per QA/QC procedures, (SRA QAP)

5. Field blanks were provided by the laboratory, in accordance with QA/QC procedures, (SRA QAP). Field blanks were provided to document absence of contamination or introduction of extraneous-origin analytes or interferences.

6. The following information was recorded on the sample tag or label.

Site number:
Date: Time:
Name of Collector:
Preservation Used:
Analysis Required:

This work was accomplished by C. A. Sorrells, who also provided the proper preservation for each sample, according to required analysis for the respective aliquots by container.

7. A hard-covered bound Field Book was used to record the same data as was listed on the sample tag, plus shoreline distance from a known starting point. This log was kept by C. A. Sorrells.

8. Samples were preserved by immediately by chilling the sample jar in a durable ice chest with crushed ice.

9. Chain of Custody Forms were completed. See copy in Section 9, Page .

10. Samples were transported immediately by Sorrells Research Associates, Inc. to the laboratory in Little Rock Arkansas for Analysis.

April 15, 1988

Mr. Joe Porter, Environmental Engineer
Cedar Chemical Corporation
P.O. Box 2749
West Helena AR 72390

RE: Surface Impoundment Sampling and Analysis

Dear Mr. Porter:

Attached please find final report on the Cedar Chemical Project. We appreciate your patronage.

Thank you for this opportunity to provide Laboratory Services.

Yours truly,

K. E. Sorrells, M.S., Consulting Chemist

K. E. Sorrells

President, Sorrells Research Associates, Inc.

AW01.4lsm

ADDENDUM

DISCUSSION OF REPORTING UNITS: Throughout this report analytes in WATER samples are reported in milligrams per liter (mg/liter), that in weight per volume, approximately equivalent to parts per million, with the exception, of course, of measurements where other units are appropriate, such as Degrees Celsius, pH units, units of Specific Conductance, and so forth.

In accordance with accepted professional practice and current engineering practice, throughout this report analytes in SEDIMENT samples are reported in milligrams per kilogram (mg/kg), which is parts per million. The rational basis for this distinction is that aliquots of solids, semisolids, slurries, sludges, soils, and sediments are measured out by weight of sample.

It also should be clearly understood that this reporting practice refers to the analyte concentration in the sample as collected; that is on a wet weight as is basis; no other basis is implied. For purposes of comparison the Total Solids is reported for each sample.

The difference between the Total Solids reported and 100 percent is the Loss on Drying. (Oven Dried Basis. This is a Standard Methods procedure.)

With these distinctions clearly stated, throughout this report, Alkalinity has been reported as Calcium Carbonate ($CaCO_3$), either in mg/liter in water samples, or mg/kg in sediment samples. In either case the mg or parts refers to the alkalinity EXPRESSED as Calcium Carbonate per liter/per kg/per million SAMPLE, as the case may be.

ADDENDUM

DISCUSSION OF METHODOLOGY: Organic analytes extracted from water and sediment samples from this project were analyzed by Gas Chromatography - Mass Spectrometry. (GC-MS) Descriptions of equipment, methods, detection limits, personnel, dates and times of beginning specific sample analysis, results of replicate determinations and illustrations are included in the appropriate sections of this report.

Updates to the general Quality Assurance Plan (QAP) with appropriate Apppendices for references are included with the current revision of this project report.

GENERAL ANALYSIS

TABLE GA-1
General Analysis

Cedar Chemical Corporation
P.O. Box 2749
West Helena, AR 72390

Attn: Mr. Joe Porter, Environmental Engineer

Re: B553.001 CEDR

Date Received: January 15, 1988

Date Reported: March 14, 1988

Surface Impoundment sampling and analysis. Bottom Sample from south corner of equalization pond located 25 feet northeast of influent pipe.

Collected by: K. E. Sorrells / Cecil A. Sorrells / Michael G. Martin at 1110 hours Central Standard Time (CST). Observed by Joe E. Porter and Dale Kummer.

ANALYTE	UNITS	FOUND
Field pH	units	7.34
Alkalinity	Mg/kg as CACO3	470
Total Suspended Solids	Mg/Kg	6,320
Total Volatile Solids	Mg/Kg	2,390
Total Solids	Mg/Kg	8,720 +- 810
Ammonia-Nitrogen	Mg/Kg	36.81
Chloride	Mg/Kg	198
COD	Mg/Kg	3,410
Cyanide	Mg/Kg	0.029
Flashpoint	Celsius	Negative
Nitrate	Mg/Kg	0.028
Nitrite	Mg/Kg	0
Total Phosphorus	Mg/Kg	32.8
TOC	Mg/Kg	341.5 +- 7.0
Field Specific Conductance	MicroS/cm	850
Sulfate	Mg/Kg	38.5
Sulfite	Mg/Kg	25
Sulfide	Mg/Kg	2.36
Temperature	Celsius	5.5
Arsenic	Mg/Kg	0.92
Aluminum	Mg/Kg	87.4
Cadmium	Mg/Kg	0.013
Chromium	Mg/Kg	0.364
Lead	Mg/Kg	0.24
Mercury	Mg/Kg	0.0428

Reviewed by: K. E. Sorrells, M.S. [KS] (Initials)

TABLE GA-2
General Analysis

Cedar Chemical Corporation
P.O. Box 2749
West Helena, AR 72390

Attn: Mr. Joe Porter, Environmental Engineer

Re: B553.002 CEDR

Date Received: January 15, 1988

Date Reported: March 14, 1988

Surface Impoundment sampling and analysis. Equalization Pond Bottom Sample 60 feet northwest of south corner.

Collected by: K. E. Sorrells / Cecil A. Sorrells / Michael G. Martin at 1145 hours CST.
Observed by Joe E. Porter and Dale Kummer.

ANALYTE	UNITS	FOUND
Field pH	units	6.58
Alkalinity	Mg/kg as CACO3	522
Total Suspended Solids	Mg/Kg	2,700
Total Volatile Solids	Mg/Kg	2,080
Total Solids	Mg/Kg	4,790 +- 80
Ammonia-Nitrogen	Mg/Kg	36.68
Chloride	Mg/Kg	191
COD	Mg/Kg	2,690
Cyanide	Mg/Kg	0.005
Flashpoint	Celsius	None - Ambient to 60 *
Nitrate	Mg/Kg	0.674
Nitrite	Mg/Kg	0
Total Phosphorus	Mg/Kg	29.9
TOC	Mg/Kg	281.9 +- 15.0
Field Specific Conductance	MicroS/cm	800
Sulfate	Mg/Kg	37
Sulfite	Mg/Kg	40
Sulfide	Mg/Kg	6.04
Temperature	Celsius	4.5
Arsenic	Mg/Kg	0.30
Aluminum	Mg/Kg	32.5
Cadmium	Mg/Kg	0.007
Chromium	Mg/Kg	0.139
Lead	Mg/Kg	0.125
Mercury	Mg/Kg	0.0293

** No flash observed between ambient temperature and 60 Degrees Celsius.

Reviewed by: K. E. Sorrells, M.S. [ ] (Initials)

TABLE GA-3
General Analysis

Cedar Chemical Corporation
P.O. Box 2749
West Helena, AR 72390

Attn: Mr. Joe Porter, Environmental Engineer

Re: B553.003 CEDR

Date Received: January 15, 1988

Date Reported: March 14, 1988

Surface Impoundment sampling and analysis. Equalization Pond Bottom Sample located 125 feet northwest of east corner.

Collected by: K. E. Sorrells / Cecil A. Sorrells / Michael G. Martin at 1207 hours CST.
Observed by Joe E. Porter and Dale Kummer.

ANALYTE	UNITS	FOUND
Field pH	units	6.83
Alkalinity	Mg/kg as CACO3	456
Total Suspended Solids	Mg/Kg	3,110
Total Volatile Solids	Mg/Kg	1,420
Total Solids	Mg/Kg	3,545 +- 95
Ammonia-Nitrogen	Mg/Kg	32.03
Chloride	Mg/Kg	136
COD	Mg/Kg	1,710
Cyanide	Mg/Kg	0.019
Flashpoint	Celsius	Negative
Nitrate	Mg/Kg	0.513
Nitrite	Mg/Kg	0
Total Phosphorus	Mg/Kg	33.4
TOC	Mg/Kg	182.7 +- 6.4
Field Specific Conductance	MicroS/cm	890
Sulfate	Mg/Kg	49.75
Sulfite	Mg/Kg	30
Sulfide	Mg/Kg	2.82
Temperature	Celsius	6.0
Arsenic	Mg/Kg	0.38
Aluminum	Mg/Kg	23.1
Cadmium	Mg/Kg	0.007
Chromium	Mg/Kg	0.106
Lead	Mg/Kg	0.116
Mercury	Mg/Kg	0.0129

Reviewed by: K. E. Sorrells, M.S. [ ] (Initials)

TABLE GA-4
General Analysis

Cedar Chemical Corporation
P.O. Box 2749
West Helena, AR 72390

Attn: Mr. Joe Porter, Environmental Engineer

Re: B553.004 CEDR

Date Received: January 15, 1988

Date Reported: March 14, 1988

Surface Impoundment sampling and analysis. Equalization Pond Bottom Sample located 100 feet southwest of north corner.

Collected by: K. E. Sorrells / Cecil A. Sorrells / Michael G. Martin at 1255 hours CST. Observed by Joe E. Porter and Dale Krummer.

ANALYTE	UNITS	FOUND
Field pH	units	6.58
Alkalinity	Mg/kg as CACO3	446
Total Suspended Solids	Mg/Kg	2,790
Total Volatile Solids	Mg/Kg	1,560
Total Solids	Mg/Kg	3,485 +- 55
Ammonia-Nitrogen	Mg/Kg	27.38
Chloride	Mg/Kg	223
COD	Mg/Kg	1,220
Cyanide	Mg/Kg	0.008
Flashpoint	Celsius	Negative
Nitrate	Mg/Kg	0.037
Nitrite	Mg/Kg	0
Total Phosphorus	Mg/Kg	24.9
TOC	Mg/Kg	230.6 +- 18.0
Field Specific Conductance	MicroS/cm	890
Sulfate	Mg/Kg	44.5
Sulfite	Mg/Kg	30
Sulfide	Mg/Kg	42
Temperature	Celsius	5.8
Arsenic	Mg/Kg	0.43
Aluminum	Mg/Kg	35.6
Cadmium	Mg/Kg	0.011
Chromium	Mg/Kg	0.266
Lead	Mg/Kg	0.21
Mercury	Mg/Kg	0.043

Reviewed by: K. E. Sorrells, M.S. [ ] (Initials)

TABLE GA-5
General Analysis

Cedar Chemical Corporation
P.O. Box 2749
West Helena, AR 72390

Attn: Mr. Joe Porter, Environmental Engineer

Re: B553.005a CEDR

Date Received: January 15, 1988

Date Reported: March 14, 1988

Surface Impoundment sampling and analysis. Equalization Pond Water Sample located on northeast side 160 feet northwest of east corner.

Collected by: K. E. Sorrells / Cecil A. Sorrells / Michael G. Martin at 1230 hours CST. Observed by Joe E. Porter and Dale Krummer.

ANALYTE	UNITS	FOUND
Field pH	units	6.69
Alkalinity	Mg/l as CACO3	324
Total Suspended Solids	Mg/Liter	50
Total Volatile Solids	Mg/Liter	260
Total Solids	Mg/Liter	1,050 +- 140
Ammonia-Nitrogen	Mg/Liter	27.87
Chloride	Mg/Liter	193
COD	Mg/Liter	406
Cyanide	Mg/Liter	0.012
Flashpoint	Celsius	Negative
Nitrate	Mg/Liter	0.028
Nitrite	Mg/Liter	0
Total Phosphorus	Mg/Liter	9.23
TOC	Mg/Liter	77.6 +- 2.9
Field Specific Conductance	MicroS/cm	720
Sulfate	Mg/Liter	70.75
Sulfite	Mg/Liter	30
Sulfide	Mg/Liter	0.651
Temperature	Celsius	6.0
Arsenic	Mg/Liter	0.27
Aluminum	Mg/Liter	0.343
Cadmium	Mg/Liter	0.003
Chromium	Mg/Liter	< 0.003
Lead	Mg/Liter	< 0.01
Mercury	Mg/Liter	0.0011

Reviewed by: K. E. Sorrells, M.S. [ ] (Initials)

TABLE GA-5
General Analysis

Cedar Chemical Corporation
P.O. Box 2749
West Helena, AR 72390

Attn: Mr. Joe Porter, Environmental Engineer

Re: B553.005b CEDR
Field Replicate

Date Received: January 15, 1988

Date Reported: March 14, 1988

Surface Impoundment sampling and analysis. Equalization Pond Water Sample located on northeast side 160 feet northwest of east corner.

Collected by: K. E. Sorrells / Cecil A. Sorrells / Michael G. Martin at 1230 hours CST. Observed by Joe E. Porter and Dale Krummer.

ANALYTE	UNITS	FOUND
Field pH	units	6.72
Alkalinity	Mg/l as CACO3	336
Total Suspended Solids	Mg/Liter	67.3
Total Volatile Solids	Mg/Liter	200
Total Solids	Mg/Liter	1,000 +- 80
Ammonia-Nitrogen	Mg/Liter	24.69
Chloride	Mg/Liter	171
COD	Mg/Liter	671
Cyanide	Mg/Liter	0.017
Flashpoint	Celsius	Negative
Nitrate	Mg/Liter	0.023
Nitrite	Mg/Liter	0
Total Phosphorus	Mg/Liter	9.23
TOC	Mg/Liter	83.4 +- 0.82
Field Specific Conductance	MicroS/cm	700
Sulfate	Mg/Liter	72.13
Sulfite	Mg/Liter	30
Sulfide	Mg/Liter	0.61
Temperature	Celsius	5.5
Arsenic	Mg/Liter	0.26
Aluminum	Mg/Liter	0.343
Cadmium	Mg/Liter	0.003
Chromium	Mg/Liter	< 0.003
Lead	Mg/Liter	0.017
Mercury	Mg/Liter	< 0.0005

Reviewed by: K. E. Sorrells, M.S. [ ] (Initials)

TABLE GA-7
General Analysis

Cedar Chemical Corporation
P.O. Box 2749
West Helena, AR 72390

Attn: Mr. Joe Porter, Environmental Engineer

Re: B553.006 CEDR

Date Received: January 15, 1988

Date Reported: March 14, 1988

Surface Impoundment sampling and analysis. Water sample from discharge pipe from Aeration Pond.

Collected by: K. E. Sorrells / Cecil A. Sorrells / Michael G. Martin at 1320 hours CST. Observed by Joe E. Porter and Dale Krummer.

ANALYTE	UNITS	FOUND
Field pH	units	8.25
Alkalinity	Mg/l as CACO3	3,000
Total Suspended Solids	Mg/Liter	597
Total Volatile Solids	Mg/Liter	3,080
Total Solids	Mg/Liter	15,750 +- 150
Ammonia-Nitrogen	Mg/Liter	365.2
Chloride	Mg/Liter	2,640
COD	Mg/Liter	2,590
Cyanide	Mg/Liter	0.045
Flashpoint	Celsius	* Negative
Nitrate	Mg/Liter	0.083
Nitrite	Mg/Liter	0
Total Phosphorus	Mg/Liter	19
TOC	Mg/Liter	646.2 +- 24.0
Field Specific Conductance	MicroS/cm	11,000
Sulfate	Mg/Liter	2,270
Sulfite	Mg/Liter	55
Sulfide	Mg/Liter	0.112
Temperature	Celsius	2.2
Arsenic	Mg/Liter	0.83
Aluminum	Mg/Liter	2.05
Cadmium	Mg/Liter	0.012
Chromium	Mg/Liter	0.09
Lead	Mg/Liter	0.186
Mercury	Mg/Liter	0.0013

* Single flash at 104 (F) but will not sustain combustion at standard temperature and pressure. 40 CFR(261.21(2))

Reviewed by: K. E. Sorrells, M.S. [ ] (Initials)

TABLE GA-8
General Analysis

Cedar Chemical Corporation
P.O. Box 2749
West Helena, AR 72390

Attn: Mr. Joe Porter, Environmental Engineer

Re: B553.007 CEDR

Date Received: January 15, 1988

Date Reported: March 14, 1988

Surface Impoundment sampling and analysis. Recycled sludge sample from Aeration Pond clarifier.

Collected by: Joe Porter / Dale Kummer at 1300 hours CST.

ANALYTE	UNITS	FOUND
Field pH	units	7.84
Alkalinity	Mg/kg as CACO3	1200
Total Suspended Solids	Mg/Kg	8,000
Total Volatile Solids	Mg/Kg	8,190
Total Solids	Mg/Kg	23,150 +- 50
Ammonia-Nitrogen	Mg/Kg	137
Chloride	Mg/Kg	872
COD	Mg/Kg	2,850
Cyanide	Mg/Kg	0.065
Flashpoint	Celsius	** Negative
Nitrate	Mg/Kg	0.014
Nitrite	Mg/Kg	0
Total Phosphorus	Mg/Kg	49.6
TOC	Mg/Kg	1148 +- 24.0
Field Specific Conductance	MicroS/cm	11,500
Sulfate	Mg/Kg	2,720
Sulfite	Mg/Kg	55
Sulfide	Mg/Kg	8.16
Temperature	Celsius	6.2
Arsenic	Mg/Kg	1.275
Aluminum	Mg/Kg	36.3
Cadmium	Mg/Kg	0.023
Chromium	Mg/Kg	0.559
Lead	Mg/Kg	0.583
Mercury	Mg/Kg	0.0179

** No flash observed between ambient temperature and 60 Degrees Celsius.

Reviewed by: K. E. Sorrells, M.S. [ ] (Initials)

TABLE GA-9
General Analysis

Cedar Chemical Corporation
P.O. Box 2749
West Helena, AR 72390

Attn: Mr. Joe Porter, Environmental Engineer

Re: B553.008 CEDR

Date Received: January 15, 1988

Date Reported: March 14, 1988

Surface Impoundment sampling and analysis. Bottom Sediment Sample located 25 feet northeast of west corner of Polish Pond.

Collected by: K. E. Sorrells / Cecil A. Sorrells / Michael G. Martin at 1340 hours CST. Observed by Joe E. Porter and Dale Krummer.

ANALYTE	UNITS	FOUND
Field pH	units	7.01
Alkalinity	Mg/kg as CACO3	522
Total Suspended Solids	Mg/Kg	3,380
Total Volatile Solids	Mg/Kg	734
Total Solids	Mg/Kg	3,920 +- 590
Ammonia-Nitrogen	Mg/Kg	24.8
Chloride	Mg/Kg	446
COD	Mg/Kg	4,800
Cyanide	Mg/Kg	0.005
Flashpoint	Celsius	Negative
Nitrate	Mg/Kg	0.79
Nitrite	Mg/Kg	0
Total Phosphorus	Mg/Kg	28
TOC	Mg/Kg	81.35 +- 3.9
Field Specific Conductance	MicroS/cm	1,900
Sulfate	Mg/Kg	550
Sulfite	Mg/Kg	25
Sulfide	Mg/Kg	0.951
Temperature	Celsius	4.5
Arsenic	Mg/Kg	0.96
Aluminum	Mg/Kg	19.2
Cadmium	Mg/Kg	0.004
Chromium	Mg/Kg	0.125
Lead	Mg/Kg	0.14
Mercury	Mg/Kg	0.0014

** No flash observed between ambient temperature and 60 Degrees Celsius.

Reviewed by: K. E. Sorrells, M.S. [ ] (Initials)

TABLE GA-10
General Analysis

Cedar Chemical Corporation
P.O. Box 2749
West Helena, AR 72390

Attn: Mr. Joe Porter, Environmental Engineer

Re: B553.009a CEDR

Date Received: January 15, 1988

Date Reported: March 14, 1988

Surface Impoundment sampling and analysis. Bottom Sediment Sample located 125 feet northeast of south corner of Polish Pond.

Collected by: K. E. Sorrells / Cecil A. Sorrells / Michael G. Martin at 1405 hours CST. Observed by Joe E. Porter and Dale Krummer.

ANALYTE	UNITS	FOUND
Field pH	units	6.83
Alkalinity	Mg/kg as CACO3	590
Total Suspended Solids	Mg/Kg	4,250 +- 210
Total Volatile Solids	Mg/Kg	1,270
Total Solids	Mg/Kg	7,000 +- 210
Ammonia-Nitrogen	Mg/Kg	31.18
Chloride	Mg/Kg	986
COD	Mg/Kg	1,000
Cyanide	Mg/Kg	0.013
Flashpoint	Celsius	* Negative
Nitrate	Mg/Kg	0.115
Nitrite	Mg/Kg	0
Total Phosphorus	Mg/Kg	13.3
TOC	Mg/Kg	213.62 +- 5.9
Field Specific Conductance	MicroS/cm	1,350
Sulfate	Mg/Kg	195
Sulfite	Mg/Kg	30
Sulfide	Mg/Kg	4.92
Temperature	Celsius	3.9
Arsenic	Mg/Kg	0.35
Aluminum	Mg/Kg	11.8
Cadmium	Mg/Kg	< 0.003
Chromium	Mg/Kg	0.061
Lead	Mg/Kg	0.093
Mercury	Mg/Kg	0.0069

* Single flash at 104 (F) but will not sustain combustion at standard temperature and pressure. 40 CFR(261.21(2))

Reviewed by: K. E. Sorrells, M.S. [EJ] (Initials)

TABLE GA-11
General Analysis

Cedar Chemical Corporation
P.O. Box 2749
West Helena, AR 72390

Attn: Mr. Joe Porter, Environmental Engineer

Re: B553.009b CEDR
Field Replicate

Date Received: January 15, 1988

Date Reported: March 14, 1988

Surface Impoundment sampling and analysis. Bottom Sediment Sample located 125 feet northeast of south corner of Polish Pond.

Collected by: K. E. Sorrells / Cecil A. Sorrells / Michael G. Martin at 1405 hours CST. Observed by Joe E. Porter and Dale Krummer.

ANALYTE	UNITS	FOUND
Field pH	units	6.94
Alkalinity	Mg/kg as CACO3	588
Total Suspended Solids	Mg/Kg	6,560
Total Volatile Solids	Mg/Kg	2,020
Total Solids	Mg/Kg	7,360 +- 140
Ammonia-Nitrogen	Mg/Kg	28.5
Chloride	Mg/Kg	963
COD	Mg/Kg	3,730
Cyanide	Mg/Kg	0.011
Flashpoint	Celsius	* Negative
Nitrate	Mg/Kg	0.416
Nitrite	Mg/Kg	0
Total Phosphorus	Mg/Kg	22
TOC	Mg/Kg	224.0 +- 19.1
Field Specific Conductance	MicroS/cm	1,320
Sulfate	Mg/Kg	199
Sulfite	Mg/Kg	30
Sulfide	Mg/Kg	5.19
Temperature	Celsius	2.5
Arsenic	Mg/Kg	0.35
Aluminum	Mg/Kg	13.6
Cadmium	Mg/Kg	< 0.003
Chromium	Mg/Kg	0.061
Lead	Mg/Kg	0.075
Mercury	Mg/Kg	0.0045

* Single flash at 104 (F) but will not sustain combustion at standard temperature and pressure. 40 CFR(261.21(2))

Reviewed by: K. E. Sorrells, M.S. [ ] (Initials)

ORGANIC ANALYSIS

TABLE OA-1
Organic Analysis

Cedar Chemical Corporation
P.O. Box 2749
West Helena, AR 72390

Attn: Mr. Joe Porter, Environmental Engineer

Re: B553.001 CEDR

Date Received: January 15, 1988

Date Reported: March 14, 1988

Surface Impoundment sampling and analysis. Bottom Sample from south corner of equalization pond located 25 feet northeast of influent pipe.

Collected by: K. E. Sorrells / Cecil A. Sorrells / Michael G. Martin at 1110 hours CSD. Observed by Joe E. Porter and Dale Kummer.

ANALYTE	UNITS	FOUND
Ethylene Dichloride	Mg/Kg	0.0031
Methyl Isobutyl Ketone	Mg/Kg	< 0.01
Mesityl Oxide	Mg/Kg	< 0.01
Toluene	Mg/Kg	0.046
o-Xylene	Mg/Kg	0.0112
m-Xylene	Mg/Kg	0.0044
p-Xylene	Mg/Kg	0.0029
Isophorone	Mg/Kg	0.948
Dimethyl Acetamide	Mg/Kg	< 0.01
3,4-Dichloroaniline	Mg/Kg	0.177
Propanil	Mg/Kg	< 0.01
Phenol	Mg/Kg	< 0.01
Total Organic Halide	Mg/Kg	3.14

Reviewed by: K. E. Sorrells, M.S. [ ] (Initials)

TABLE OA-2
Organic Analysis

Cedar Chemical Corporation
P.O. Box 2749
West Helena, AR 72390

Attn: Mr. Joe Porter, Environmental Engineer

Re: B553.002 CEDR

Date Received: January 15, 1988

Date Reported: March 14, 1988

Surface Impoundment sampling and analysis. Equalization Pond Bottom Sample located 60 feet northwest of south corner.

Collected by: K. E. Sorrells / Cecil A. Sorrells / Michael G. Martin at 1145 hours CST. Observed by Joe E. Porter and Dale Kummer.

ANALYTE	UNITS	FOUND
Ethylene Dichloride	Mg/Kg	0.0049
Methyl Isobutyl Ketone	Mg/Kg	< 0.01
Mesityl Oxide	Mg/Kg	< 0.01
Toluene	Mg/Kg	0.024
o-Xylene	Mg/Kg	0.0064
m-Xylene	Mg/Kg	0.0025
p-Xylene	Mg/Kg	0.0029
Isophorone	Mg/Kg	1.32
Dimethyl Acetamide	Mg/Kg	< 0.01
3,4-Dichloroaniline	Mg/Kg	0.276
Propanil	Mg/Kg	< 0.01
Phenol	Mg/Kg	< 0.01
Total Organic Halide	Mg/Kg	0.781

Reviewed by: K. E. Sorrells, M.S. [KES] (Initials)

TABLE OA-3
Organic Analysis

Cedar Chemical Corporation
P.O. Box 2749
West Helena, AR 72390

Attn: Mr. Joe Porter, Environmental Engineer

Re: B553.003 CEDR

Date Received: January 15, 1988

Date Reported: March 14, 1988

Surface Impoundment sampling and analysis. Equalization Pond Bottom Sample located 125 feet northwest of east corner.

Collected by: K. E. Sorrells / Cecil A. Sorrells / Michael G. Martin at 1207 hours CST. Observed by Joe E. Porter and Dale Kummer.

ANALYTE	UNITS	FOUND
Ethylene Dichloride	Mg/Kg	0.0034
Methyl Isobutyl Ketone	Mg/Kg	< 0.01
Mesityl Oxide	Mg/Kg	< 0.01
Toluene	Mg/Kg	0.017
o-Xylene	Mg/Kg	0.0062
m-Xylene	Mg/Kg	0.0014
p-Xylene	Mg/Kg	< 0.0005
Isophorone	Mg/Kg	1.06
Dimethyl Acetamide	Mg/Kg	< 0.01
3,4-Dichloroaniline	Mg/Kg	0.253
Propanil	Mg/Kg	< 0.01
Phenol	Mg/Kg	< 0.01
Total Organic Halide	Mg/Kg	0.522

Reviewed by: K. E. Sorrells, M.S. [ ] (Initials)

TABLE OA-4
Organic Analysis

Cedar Chemical Corporation
P.O. Box 2749
West Helena, AR 72390

Attn: Mr. Joe Porter, Environmental Engineer

Re: B553.004 CEDR

Date Received: January 15, 1988

Date Reported: March 14, 1988

Surface Impoundment sampling and analysis. Equalization Pond Bottom Sample located 100 feet southwest of north corner.

Collected by: K. E. Sorrells / Cecil A. Sorrells / Michael G. Martin at 1255 hours CST. Observed by Joe E. Porter and Dale Kummer.

ANALYTE	UNITS	FOUND
Ethylene Dichloride	Mg/Kg	0.0036
Methyl Isobutyl Ketone	Mg/Kg	< 0.01
Mesityl Oxide	Mg/Kg	< 0.01
Toluene	Mg/Kg	0.016
o-Xylene	Mg/Kg	0.0122
m-Xylene	Mg/Kg	0.0027
p-Xylene	Mg/Kg	0.002
Isophorone	Mg/Kg	1.12
Dimethyl Acetamide	Mg/Kg	< 0.01
3,4-Dichloroaniline	Mg/Kg	0.238
Propanil	Mg/Kg	< 0.01
Phenol	Mg/Kg	< 0.01
Total Organic Halide	Mg/Kg	0.465

Reviewed by: K. E. Sorrells, M.S. [ ] (Initials)

TABLE OA-5
Organic Analysis

Cedar Chemical Corporation
P.O. Box 2749
West Helena, AR 72390

Attn: Mr. Joe Porter, Environmental Engineer

Re: B553.005a CEDR

Date Received: January 15, 1988

Date Reported: March 14, 1988

Surface Impoundment sampling and analysis. Equalization Pond Water Sample located on northeast side 160 feet northwest of east corner.

Collected by: K. E. Sorrells / Cecil A. Sorrells / Michael G. Martin at 1230 hours CST. Observed by Joe E. Porter and Dale Kummer.

ANALYTE	UNITS	FOUND
Ethylene Dichloride	Mg/Kg	0.0033
Methyl Isobutyl Ketone	Mg/Kg	< 0.01
Mesityl Oxide	Mg/Kg	< 0.01
Toluene	Mg/Kg	0.016
o-Xylene	Mg/Kg	0.0011
m-Xylene	Mg/Kg	0.0009
p-Xylene	Mg/Kg	0.0013
Isophorone	Mg/Kg	1.38
Dimethyl Acetamide	Mg/Kg	< 0.01
3,4-Dichloroaniline	Mg/Kg	0.206
Propanil	Mg/Kg	< 0.01
Phenol	Mg/Kg	< 0.01
Total Organic Halide	Mg/Kg	0.484

Reviewed by: K. E. Sorrells, M.S. [ ] (Initials)

TABLE OA-6
Organic Analysis

Cedar Chemical Corporation
P.O. Box 2749
West Helena, AR 72390

Attn: Mr. Joe Porter, Environmental Engineer

Re: B553.005b CEDR

Date Received: January 15, 1988

Date Reported: March 14, 1988

Surface Impoundment sampling and analysis. Equalization Pond Water Sample located on northeast side 160 feet northwest of east corner.

Collected by: K. E. Sorrells / Cecil A. Sorrells / Michael G. Martin at 1230 hours CST. Observed by Joe E. Porter and Dale Kummer.

ANALYTE	UNITS	FOUND
Ethylene Dichloride	Mg/Kg	0.0034
Methyl Isobutyl Ketone	Mg/Kg	< 0.01
Mesityl Oxide	Mg/Kg	< 0.01
Toluene	Mg/Kg	0.015
o-Xylene	Mg/Kg	0.0005
m-Xylene	Mg/Kg	0.0009
p-Xylene	Mg/Kg	0.0014
Isophorone	Mg/Kg	1.39
Dimethyl Acetamide	Mg/Kg	< 0.01
3,4-Dichloroaniline	Mg/Kg	0.239
Propanil	Mg/Kg	< 0.01
Phenol	Mg/Kg	< 0.01
Total Organic Halide	Mg/Kg	0.551

Reviewed by: K. E. Sorrells, M.S. [ ] (Initials)

TABLE OA-7
Organic Analysis

Cedar Chemical Corporation
P.O. Box 2749
West Helena, AR 72390

Attn: Mr. Joe Porter, Environmental Engineer

Re: B553.006 CEDR Date Received: January 15, 1988

Date Reported: March 14, 1988

Surface Impoundment sampling and analysis. Water Sample from discharge pipe from Aeration Pond.

Collected by: K. E. Sorrells / Cecil A. Sorrells / Michael G. Martin at 1320 hours CST. Observed by Joe E. Porter and Dale Kummer.

ANALYTE	UNITS	FOUND
Ethylene Dichloride	Mg/Kg	< 0.0002
Methyl Isobutyl Ketone	Mg/Kg	< 0.01
Mesityl Oxide	Mg/Kg	< 0.01
Toluene	Mg/Kg	0.003
o-Xylene	Mg/Kg	0.0376
m-Xylene	Mg/Kg	0.0062
p-Xylene	Mg/Kg	0.0077
Isophorone	Mg/Kg	0.074
Dimethyl Acetamide	Mg/Kg	< 0.01
3,4-Dichloroaniline	Mg/Kg	0.8
Propanil	Mg/Kg	0.035
Phenol	Mg/Kg	< 0.01
Total Organic Halide	Mg/Kg	0.464

Reviewed by: K. E. Sorrells, M.S. [ ] (Initials)

TABLE OA-8
Organic Analysis

Cedar Chemical Corporation
P.O. Box 2749
West Helena, AR 72390

Attn: Mr. Joe Porter, Environmental Engineer

Re: B553.007 CEDR

Date Received: January 15, 1988

Date Reported: March 14, 1988

Surface Impoundment sampling and analysis. Recycled sludge sample from Aeration Pond clarifier.

Collected by: Joe Porter / Dale Kummer at 1300 hours CST.

ANALYTE	UNITS	FOUND
Ethylene Dichloride	Mg/Kg	0.006
Methyl Isobutyl Ketone	Mg/Kg	< 0.01
Mesityl Oxide	Mg/Kg	< 0.01
Toluene	Mg/Kg	0.004
o-Xylene	Mg/Kg	0.0494
m-Xylene	Mg/Kg	0.0035
p-Xylene	Mg/Kg	0.009
Isophorone	Mg/Kg	0.094
Dimethyl Acetamide	Mg/Kg	< 0.01
3,4-Dichloroaniline	Mg/Kg	1.47
Propanil	Mg/Kg	0.037
Phenol	Mg/Kg	< 0.01
Total Organic Halide	Mg/Kg	1.01

Reviewed by: K. E. Sorrells, M.S. [ ] (Initials)

TABLE OA-9
Organic Analysis

Cedar Chemical Corporation
P.O. Box 2749
West Helena, AR 72390

Attn: Mr. Joe Porter, Environmental Engineer

Re: B553.008 CEDR

Date Received: January 15, 1988

Date Reported: March 14, 1988

Surface Impoundment sampling and analysis. Bottom Sediment Sample located 25 feet northeast of west corner of Polish Pond.

Collected by: K. E. Sorrells / Cecil A. Sorrells / Michael G. Martin at 1340 hours CST. Observed by Joe E. Porter and Dale Kummer.

ANALYTE	UNITS	FOUND
Ethylene Dichloride	Mg/Kg	< 0.0002
Methyl Isobutyl Ketone	Mg/Kg	< 0.01
Mesityl Oxide	Mg/Kg	< 0.01
Toluene	Mg/Kg	0.026
o-Xylene	Mg/Kg	0.0017
m-Xylene	Mg/Kg	0.015
p-Xylene	Mg/Kg	0.0054
Isophorone	Mg/Kg	0.049
Dimethyl Acetamide	Mg/Kg	< 0.01
3,4-Dichloroaniline	Mg/Kg	0.094
Propanil	Mg/Kg	< 0.01
Phenol	Mg/Kg	< 0.01
Total Organic Halide	Mg/Kg	0.553

Reviewed by: K. E. Sorrells, M.S. [ ] (Initials)

TABLE OA-10
Organic Analysis

Cedar Chemical Corporation
P.O. Box 2749
West Helena, AR 72390

Attn: Mr. Joe Porter, Environmental Engineer

Re: B553.009a CEDR

Date Received: January 15, 1988

Date Reported: March 14, 1988

Surface Impoundment sampling and analysis. Bottom Sediment Sample located 125 feet northeast of south corner of Polish Pond.

Collected by: K. E. Sorrells / Cecil A. Sorrells / Michael G. Martin at 1405 hours CST. Observed by Joe E. Porter and Dale Kummer.

ANALYTE	UNITS	FOUND
Ethylene Dichloride	Mg/Kg	0.0006
Methyl Isobutyl Ketone	Mg/Kg	< 0.01
Mesityl Oxide	Mg/Kg	< 0.01
Toluene	Mg/Kg	0.003
o-Xylene	Mg/Kg	< 0.0005
m-Xylene	Mg/Kg	0.0069
p-Xylene	Mg/Kg	0.0016
Isophorone	Mg/Kg	0.111
Dimethyl Acetamide	Mg/Kg	< 0.01
3,4-Dichloroaniline	Mg/Kg	0.078
Propanil	Mg/Kg	< 0.01
Phenol	Mg/Kg	< 0.01
Total Organic Halide	Mg/Kg	0.296

Reviewed by: K. E. Sorrells, M.S. [ ] (Initials)

TABLE OA-11
Organic Analysis

Cedar Chemical Corporation
P.O. Box 2749
West Helena, AR 72390

Attn: Mr. Joe Porter, Environmental Engineer

Re: B553.009b CEDR

Date Received: January 15, 1988

Date Reported: March 14, 1988

Surface Impoundment sampling and analysis. Bottom Sediment Sample located 125 feet northeast of south corner of Polish Pond.

Collected by: K. E. Sorrells / Cecil A. Sorrells / Michael G. Martin at 1405 hours CST. Observed by Joe E. Porter and Dale Kummer.

ANALYTE	UNITS	FOUND
Ethylene Dichloride	Mg/Kg	0.0059
Methyl Isobutyl Ketone	Mg/Kg	< 0.01
Mesityl Oxide	Mg/Kg	< 0.01
Toluene	Mg/Kg	0.002
o-Xylene	Mg/Kg	< 0.0005
m-Xylene	Mg/Kg	0.0075
p-Xylene	Mg/Kg	< 0.0005
Isophorone	Mg/Kg	0.054
Dimethyl Acetamide	Mg/Kg	< 0.01
3,4-Dichloroaniline	Mg/Kg	0.078
Propanil	Mg/Kg	< 0.01
Phenol	Mg/Kg	< 0.01
Total Organic Halide	Mg/Kg	0.193

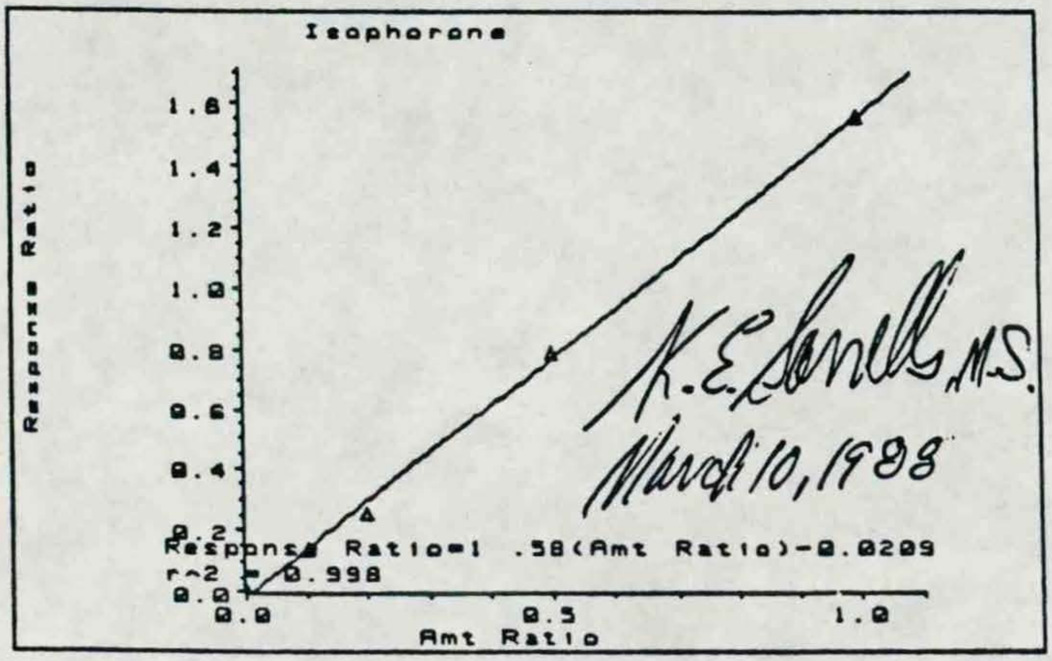
Reviewed by: K. E. Sorrells, M.S. [KS] (Initials)

C A L I B R A T I O N   T A B L E   E D I T   Rev 3.1.1 31-Mar-86

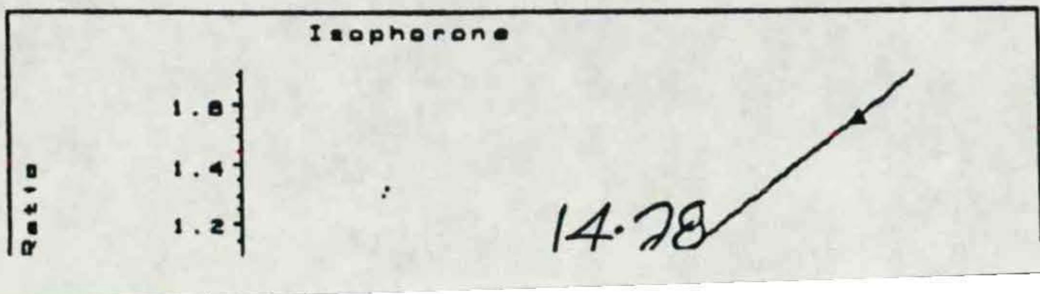
Calibration Table : DATA:CEDAR.Q

Ret Time	Pk#	Signal Descr		Amt ng/ul	Lvl	RespFact	Pk-Type	Partial Name
10.519	16	Mass	456.00 amu	20.00	2	7.141e-6	+ISTD	1 4,4'Dibromooc
				20.00	3	6.949e-6		
				20.00	1	6.910e-6		
				20.00	5	6.640e-6		
				20.00	4	5.863e-6		
11.466	17	Mass	161.00 amu	0.007600	5	9.036e-6		1 Propanil
				10.00	4	9.029e-6		
				15.00	3	8.208e-6		
				20.00	2	8.553e-6		
				40.00	1	6.138e-6		
11.467	18	Mass	219.00 amu	0.06700	5	63.62e-6		1 Prl 3
				10.00	4	63.69e-6		
				15.00	3	63.47e-6		
				20.00	2	69.09e-6		
				40.00	1	47.14e-6		

Next Page | Prev Page | INS/DEL KEYS | Extended Info | EXIT



K.E. Sorrell, M.S.
March 10, 1988



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DATA SUMMARY

SAMPLE IDENTIFICATION

LABORATORY NUMBER

B553.001
Bottom Sample from south corner of equalization pond located 25 feet northeast of influent pipe.

B553.002
Equalization Pond Bottom Sample 60 feet northwest of south corner.

B553.003
Equalization Pond Bottom Sample located 125 feet northwest of east corner.

B553.004
Equalization Pond Bottom Sample located 100 feet southwest of north corner.

B553.005a
Equalization Pond Water Sample located on northeast side 160 feet northwest of east corner.

B553.005b
Equalization Pond Water Sample located on northeast side 160 feet northwest of east corner.

B553.006
Water sample from discharge pipe from Aeration Pond. Failed F.P.

B553.007
Recycled sludge sample from Aeration Pond clarifier.

B553.008
Bottom Sediment Sample located 25 feet northeast of west corner of Polish Pond.

B553.009a
Bottom Sediment Sample located 125 feet northeast of south corner of Polish Pond.

B553.009b
Bottom Sediment Sample located 125 feet northeast of south corner of Polish Pond.

General Analysis Summary

EQ Basin

ANALYTE	B553.001	002	003	004	Water 005A	Water 005B
					Field Replicates	
	mg/kg	mg/kg	mg/kg	mg/kg	mg/l	mg/l
Field pH	7.34	6.58	6.83	6.58	6.69	6.72
Alkalinity	470	522	456	446	324	336
Total Suspended Solids	6320	2700	3110	2790	50	67.3
Total Volatile Solids	2390	2080	1420	1560	260	200
Total Solids	8720	4790	3545	3485	1050	1000
Ammonia-Nitrogen	36.81	36.68	32.03	27.38	27.87	24.69
Chloride	198	191	136	223	193	171
COD	3410	2690	1710	1220	406	671
Cyanide	.029	.005	.019	.008	.012	.017
Flashpoint	NEG	NEG	NEG	NEG	NEG	NEG
Nitrate	.028	.674	.513	.037	.028	.023
Nitrite	0	0	0	0	0	0
Total Phosphorus	32.8	29.9	33.4	24.9	9.23	9.23
TOC	341.5	281.9	182.7	230.6	77.6	83.4
Field Specific Conductance	850	800	890	890	720	700
Sulfate	38.5	37	49.75	44.5	70.75	72.13
Sulfite	25	40	30	30	30	30
Sulfide	2.36	6.04	2.82	42	.651	.61
Field Temperature	5.5	4.5	6	5.8	6	5.5
Arsenic	.92	.3	.38	.43	.27	.26
Aluminum	87.4	32.5	23.1	35.6	.343	.343
Cadmium	.013	.007	.007	.011	.003	.003
Chromium	.364	.139	.106	.266	< 0.003	< 0.003
Lead	.24	.125	.116	.21	< 0.01	.017
Mercury	.0428	.0293	.0129	.043	.0011	< 0.0005

* SINGLE FLASH AT 104 (F) BUT WILL NOT SUSTAIN COMBUSTION AT STANDARD TEMPERATURE AND PRESSURE. 40 CFR(261.21(2)

** NO FLASH OBSERVED BETWEEN AMBIENT TEMPERATURE AND 60 DEGREE CELCIUS

General Analysis Summary

ANALYTE	Aeration water 006	Clarifier 007	- Polish Pond — 008	solid 009A	solid 009B
				Field Replicates	
	mg/l	mg/kg	mg/kg	mg/kg	mg/kg
Field pH	8.25	7.84	7.01	6.83	6.94
Alkalinity	3000	1200	522	590	588
Total Suspended Solids	597	8000	3380	4250	6560
Total Volatile Solids	3080	8190	734	1270	2020
Total Solids	15750	23150	3920	7000	7360
Ammonia-Nitrogen	365.2	137	24.8	31.18	28.5
Chloride	2640	872	446	986	963
COD	2590	2850	4800	1000	3730
Cyanide	.045	.065	.005	.013	.011
Flashpoint	* NEG	** NEG	** NEG	* NEG	* NEG
Nitrate	.083	.014	.79	.115	.416
Nitrite	0	0	0	0	0
Total Phosphorus	19	49.6	28	13.3	22
TOC	646.2	1148	81.35	213.62	224
Field Specific Conductance	11000	11500	1900	1350	1320
Sulfate	2270	2720	550	195	199
Sulfite	55	55	25	30	30
Sulfide	.112	8.16	.951	4.92	5.19
Field Temperature	2.2	6.2	4.5	3.9	2.5
Arsenic	.83	1.275	.96	.35	.35
Aluminum	2.05	36.3	19.2	11.8	13.6
Cadmium	.012	.023	.004	< 0.003	< 0.003
Chromium	.09	.559	.125	.061	.061
Lead	.186	.583	.14	.093	.075
Mercury	.0013	.0179	.0014	.0069	.0045

why would these solids flash?

Fails Flash Point!
261.21(2) applies to solids

* SINGLE FLASH AT 104 (F) BUT WILL NOT SUSTAIN COMUSTION AT STANDARD TEMPERATURE AND PRESSURE. 40 CFR(261.21(2)

** NO FLASH OBSERVED BETWEEN AMBIENT TEMPERATURE AND 60 DEGREES CELSIUS

Organic Worksheet Summary

ANALYTE	DATE	TIME Hours C.S.T.	S.D.m	B553.001	002	003	004	005A	005B
								Field Replicates	
				mg/kg	mg/kg	mg/kg	mg/kg	mg/l	mg/l
* Ethylene Dichloride	2/8	1450	3%	.0031	.0049	.0034	.0036	.0033	.0034
Methyl Isobutyl Ketone	3/10	1825	7%	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Mesityl Oxide	3/10	1825	2%	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
* Toluene	1/26	1620	4%	.046	.024	.017	.016	.016	.015
* o-Xylene	1/26	1620	.0005	.0112	.0064	.0062	.0122	.0011	.0005
* m-Xylene	1/26	1620	.0001	.0044	.0025	.0014	.0027	.0009	.0009
* p-Xylene	1/26	1620	.0003	.0029	.0029	< .0005	.002	.0013	.0014
* Isophorone	3/10	1825	1.5%	.948	1.32	1.06	1.12	1.38	1.39
Dimethyl Acetamide	3/10	1825	14 %	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
* 3,4-Dichloroaniline	3/10	1825	.5%	.177	.276	.253	.238	.206	.239
Propanil	3/10	1825	2.5%	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Phenol	3/10	1825	7%	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
* Total Organic Halide	2/22	0940	11%	3.14	.781	.522	.465	.484	.551

See preceding table for Sample Point Description

Notes: All work above performed by K. E. Sorrells, M.S. except that extractions and concentrations for extracted samples performed by M. G. Martin. All GC-MS work performed by Internal Standard Quantitation. Date and Times above represent the beginning of final quantitative GLC and/or GC-MS work. The column labeled S.D.m represents the precision of the determinations as the standard deviation of the mean of replicate samples, either as % of the mean sometimes known as the Coefficient of Variation, or, where no % sign is shown, the precision is expressed as concentration for low level samples. All Concentrations are expressed in mg/kg for sludge samples, and in mg/liter for water samples.

* No significant reduction in concentrations through aggressive biological treatment

Organic Worksheet Summary

ANALYTE	DATE	TIME Hours C.D.T	S.D.*	006 mg/l	007 mg/kg	008 mg/kg	009A mg/kg (Field Replicates)	009B mg/kg (Field Replicates)
Ethylene Dichloride	2/8	1450	3%	< .0002	.006	< 0.0002	.0006	.0059
Methyl Isobutyl Ketone	3/10	1825	7%	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Mesityl Oxide	3/10	1825	2%	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	1/26	1620	4%	.003	.004	.026	.003	.002
o-Xylene	1/26	1620	.0005	.0376	.0494	.0017	< .0005	< .0005
m-Xylene	1/26	1620	.0001	.0062	.0035	.015	.0069	.0075
p-Xylene	1/26	1620	.0003	.0077	.009	.0054	.0016	< .0005
Isophorone	3/10	1825	1.5%	.074	.094	.049	.111	.054
Dimethyl Acetamide	3/10	1825	14 %	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
3,4-Dichloroaniline	3/10	1825	.5%	.8	1.47	.094	.078	.078
Propanil	3/10	1825	2.5%	.035	.037	< 0.01	< 0.01	< 0.01
Phenol	3/10	1825	7%	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Total Organic Halide	2/22	0940	11%	.464	1.01	.553	.296	.193

See preceding table for Sample Point Description

Notes: All work above performed by K. E. Sorrells, M.S. except that extractions and concentrations for extracted samples performed by M. G. Martin. All GC-MS work performed by Internal Standard Quantitation. Date and Times above represent the beginning of final quantitative GLC and/or GC-MS work. The column labeled S.D.* represents the precision of the determinations as the standard deviation of the mean of replicate samples, either as % of the mean sometimes known as the Coefficient of Variation, or, where no % sign is shown, the precision is expressed as concentration for low level samples. All Concentrations are expressed in mg/kg for sludge samples, and in mg/liter for water samples.

GENERAL ANALYSIS QUALITY ASSURANCE

ANALYSTS:

K. E. Sorrells	(KES)
Cecil A. Sorrells	(CAS)
K. E. Sorrells II	(KESII)
Michael G. Martin	(MGM)
Pennye L. Derryberry	(PLD)

QUALITY ASSURANCE

QA SUMMARY: ANALYTE/ANALYST/DATE(TIME)/STANDARD DEVIATION AS PERCENT OF THE MEAN OF REPLICATE DETERMINATIONS.

pH/KES/CAS/MGM/on-site/1-15-88/0.22%*
ALKALINITY/PLD/1-15-88/0.9%*
TOTAL SUSPENDED SOLIDS/PLD/1-21-88/0%*
TOTAL VOLATILE SOLIDS/PLD/1-21-88*RECHECKS/PLD/3-17-88/13%*
TOTAL SOLIDS/PLD/1-21-88/2%*

AMMONIA-NITROGEN/CAS/1-18-88(0900) to 1-20-88/6%*
CHLORIDE/PLD/1-21-88/6%*
CHEMICAL OXYGEN DEMAND/PLD/1-28-88(1030)/0.132%*
CYANIDE/MGM/1-21-88(1436)/17%*
FLASH POINT/PLD/1-25-88/0%*

Based on duplication of 1 sample not on replica

NITRITE/CAS/1-20-88(1600)/9.8%*
NITRATE/CAS/1-19-88(0900)/0%*
TOTAL PHOSPHORUS/PLD/1-18-88(0930)/0%*
TOTAL ORGANIC CARBON/CAS/1-18-88(1600)/3.6%*
SPECIFIC CONDUCTANCE/KES/CAS/MGM/on-site/1-15-88/1.4%*

SULFATE/PLD/1-25-88(0830)/0.97%*
SULFIDE/CAS/1-16-88(1400)/0%*
SULFITE/CAS/1-15-88(1800)/3.3%*
TEMPERATURE/KES/CAS/MGM/on-site/1-15-88/4.3%*
ARSENIC/KESII/1-29-88(1340)/1.9%*

ALUMINUM/KESII/1-22-88(0925)/0%*
CADMIUM/KESII/1-20-88(1010)/0%*
CHROMIUM/KESII/1-28-88(1025)/0%*
LEAD/KESII/1-21-88(0940)/26%*
MERCURY/KESII/1-25-88(1015)/38%*

ORGANIC ANALYSIS QUALITY ASSURANCE

ANALYSTS:

K. E. Sorrells (KES)
Michael G. Martin (MGM)

QA SUMMARY: ANALYTE/ANALYST/DATE(TIME)/STANDARD DEVIATION AS PERCENT OF THE MEAN OF REPLICATE DETERMINATIONS.

QUALITY ASSURANCE

Ethylene Dichloride/KES/2-8-88(1450)/3%*

Methyl Isobutyl Ketone/KES/3-10-88(1825)/7%*

Mesityl Oxide/KES/3-10-88(1825)/2%*

Toluene/KES/1-26-88(1620)/4%*

o-Xylene/KES/1-26-88(1620)/.0005%* 0.0005 not per cents

m-Xylene/KES/1-26-88(1620)/.0001%* 0.0001 this correct in table

p-Xylene/KES/1-26-88(1620)/.0003%* 0.0003 on page 41

Isophorone/KES/3-10-88(1825)/1.5%*

Dimethyl Acetamide/KES/3-10-88(1825)/14%*

3,4-Dichloroanaline/KES/3-10-88(1825)/.5%*

Propanil/KES/3-10-88(1825)/2.5%*

Phenol/KES/3-10-88(1825)/7%*

Total Organic Halide/2-22-88(0940)/11%*

GC-MS extraction and clean-up by Michael G. Martin on 1/28/88*

METHOD DOCUMENTATION

SORRELLS RESEARCH ASSOCIATES, INC
8002 Stanton Road
Little Rock AR 72209

PARAMETER SHEET

Parameter HYDROGEN ION

Method Electrometric

Reference Standard Methods 16th. Edition, 423

Primary Analyst Pennye Derryberry

Normal Holding Time onsite Preservative analyze immediately

Type of Container polyethylene Type of Sampler grab

Type and Model of Analytical Equipment used

Cole Parmer Chemcadet model 598450, Orion Ross model 8102

Modifications/Adjustments of Method

Field Analyst: Cecil A. Sorrells

Typical Resolution 0.01 units.

SORRELLS RESEARCH ASSOCIATES, INC
8002 Stanton Road
Little Rock AR 72209

PARAMETER SHEET

Parameter ALKALINITY, $CaCO3$

Method Titration to pH 4.5, manual

Reference Standard Methods 16th. Edition, 403

Primary Analyst Pennye Derryberry

Normal Holding Time 4 hours Preservative Cool 4. C

Type of Container polyethylene Type of Sampler grab

Type and Model of Analytical Equipment used

Cole Parmer Chemcadet model 598450

Modifications/Adjustments of Method

Typical Detection Limit 1 mg/liter as CaCO3.

SORRELLS RESEARCH ASSOCIATES, INC
8002 Stanton Road
Little Rock AR 72209

PARAMETER SHEET

Parameter TOTAL SUSPENDED SOLIDS

Method Gravimetric 103-105.C post washing of residue

Reference Standard Methods 16th. Edition 209D

Primary Analyst Pennye Derryberry

Normal Holding Time 8 hours to 2 days Preservative Cool 4.C

Type of Container polyethylene Type of Sampler grab

Type and Model of Analytical Equipment used

Mettler balance

Modifications/Adjustments of Method

~~Typical Detection Limit 0.1 mg/liter.~~

SORRELLS RESEARCH ASSOCIATES, INC
8002 Stanton Road
Little Rock AR 72209

PARAMETER SHEET

Parameter VOLATILE SOLIDS

Method Gravimetric 550 .C

Reference Standard Methods 16th. Edition 209E

Primary Analyst Pennye Derryberry

Normal Holding Time 2 to 4 days Preservative Cool 4.C

Type of Container polyethylene Type of Sampler grab

Type and Model of Analytical Equipment used

Mettler balance

Thermolyne 1200 Muffle Furnace

Modifications/Adjustments of Method

Typical Detection Limit 0.1 mg/liter.

SORRELLS RESEARCH ASSOCIATES, INC
8002 Stanton Road
Little Rock AR 72209

PARAMETER SHEET

Parameter TOTAL SOLIDS

Method Gravimetric 103 - 105 .C

Reference Standard Methods 16th. Edition 209A

Primary Analyst Pennye Derryberry

Normal Holding Time 2 to 4 days Preservative Cool 4.C

Type of Container polyethylene Type of Sampler grab

Type and Model of Analytical Equipment used

Mettler balance H31AR

Sp 180 Digital Electronic Analytical Balance. Blue M convection oven.

Modifications/Adjustments of Method

Typical Detection Limit 0.1 mg/liter.

SORRELLS RESEARCH ASSOCIATES, INC
8002 Stanton Road
Little Rock AR 72209

PARAMETER SHEET

Parameter AMMONIA as N

Method Manual distillation followed by electrode

Reference EPA 1979, 350.3

Primary Analyst Cecil Sorrells

Normal Holding Time 2 to 7 days Preservative cool 4.C,H2SO4

Type of Container polyethylene Type of Sampler grab

Type and Model of Analytical Equipment used

Ammonia porous membrane H3728201

Wheaton Distillation Apparatus

Modifications/Adjustments of Method

Typical Detection Limit .01 mg/liter.

SORRELLS RESEARCH ASSOCIATES, INC
8002 Stanton Road
Little Rock AR 72209

PARAMETER SHEET

Parameter CHLORIDE

Method Mercuric nitrate

Reference Standard Methods, 16th Edition, 407B

Primary Analyst Pennye Derryberry

Normal Holding Time 4 hrs to 3 days Preservative Cool 4, C,H2SO4

Type of Container polyethylene Type of Sampler grab

Type and Model of Analytical Equipment used

Brinkman digital buret

Modifications/Adjustments of Method

Typical Detection Limit .5 mg/liter.

SORRELLS RESEARCH ASSOCIATES, INC
8002 Stanton Road
Little Rock AR 72209

PARAMETER SHEET

Parameter CHEMICAL OXYGEN DEMAND

Method Titrimetric colorimetric

Reference Standard Methods, 16th Edition, 508A

Primary Analyst Pennye Derryberry

Normal Holding Time 4 hours to 3 days Preservative Cool 4. C,H2SO4

Type of Container polyethylene Type of Sampler grab

Type and Model of Analytical Equipment used

Ground glass reflux apparatus & Brinkman digital buret

Modifications/Adjustments of Method

Typical Detection Limit 2 mg/liter.

SORRELLS RESEARCH ASSOCIATES, INC
8002 Stanton Road
Little Rock AR 72209

PARAMETER SHEET

Parameter CYANIDE - TOTAL

Method Manual distillation with MgC12, manual spectrophotometric

Reference Standard Methods 16th. Edition, 412C

Primary Analyst Mike Martin

Normal Holding Time 2 to 5 days Preservative Cool 4 .C, NaOH

Type of Container polyethylene Type of Sampler grab

Type and Model of Analytical Equipment used

Sequoia Turner model 390 spectrophotometer

Modifications/Adjustments of Method

Typical Detection Limit < 0.004 mg/liter.

SORRELLS RESEARCH ASSOCIATES, INC
8002 Stanton Road
Little Rock AR 72209

PARAMETER SHEET

Parameter FLASHPOINT

Method Pensky-Martens Closed Cup

Reference SW-846 Section 8.1, Method 1010

Primary Analyst Pennye Derryberry

Normal Holding Time 0 to 14 days Preservative Cool 4.C

Type of Container polyethylene Type of Sampler grab

Type and Model of Analytical Equipment used

Pensky-Martens closed cup tester

Modifications/Adjustments of Method

Typical Resolution 1 . Centigrade.

SORRELLS RESEARCH ASSOCIATES, INC
8002 Stanton Road
Little Rock AR 72209

PARAMETER SHEET

Parameter NITRATE

Method Nitrate-nitrite minus Nitrite N

Reference Standard Methods 16th Edition, 418C

Primary Analyst Cecil Sorrells

Normal Holding Time 4 to 6 hours Preservative Cool 4.C

Type of Container polyethylene Type of Sampler grab

Type and Model of Analytical Equipment used

Cadmium reduction column

Sequoia Turner model 390 Spectrophotometer

Modifications/Adjustments of Method

Typical Detection Limit 0.001 mg/liter.

SORRELLS RESEARCH ASSOCIATES, INC
8002 Stanton Road
Little Rock AR 72209

PARAMETER SHEET

Parameter NITRITE

Method Spectrophotometric manual

Reference Standard Methods 16th Edition, 418C

Primary Analyst Cecil Sorrells

Normal Holding Time 4 to 6 hours Preservative Cool 4.C, H2SO4

Type of Container polyethylene Type of Sampler grab

Type and Model of Analytical Equipment used

Sequoia Turner model 390 spectrophotometer

Modifications/Adjustments of Method

Typical Detection Limit .001 mg/liter.

SORRELLS RESEARCH ASSOCIATES, INC
8002 Stanton Road
Little Rock AR 72209

PARAMETER SHEET

Parameter PHOSPHORUS - TOTAL

Method Persulfate digestion - manual ascorbic acid

Reference Standard Methods 16th. Edition 424F

Primary Analyst Pennye Derryberry

Normal Holding Time 2 to 7 days Preservative Cool 4.C,H2SO4

Type of Container polyethylene Type of Sampler grab

Type and Model of Analytical Equipment used

Sequoia turner model 390 spectrophotometer

Modifications/Adjustments of Method

Typical Detection Limit 0.01 mg/liter.

SORRELLS RESEARCH ASSOCIATES, INC
8002 Stanton Road
Little Rock AR 72209

PARAMETER SHEET

Parameter ORGANIC CARBON - TOTAL

Method Combustion of oxidation

Reference Standard Methods 16th Edition, 505

Primary Analyst Cecil Sorrells

Normal Holding Time 1 day Preservative Cool 4.C, HCl or H2SO4

Type of Container polyethylene Type of Sampler grab

Type and Model of Analytical Equipment used

Dohrman carbon analyzer model DC-80

Sludge samples are blended in high speed blender.

Modifications/Adjustments of Method

Typical Detection Limit < 0.1 mg/liter.

SORRELLS RESEARCH ASSOCIATES, INC
8002 Stanton Road
Little Rock AR 72209

PARAMETER SHEET

Parameter SPECIFIC CONDUCTANCE

Method Wheatstone bridge

Reference Standard Methods, 16th Edition 205

Primary Analyst Cecil Sorrells

Normal Holding Time 2 to 7 days Preservative Cool 4. C

Type of Container polyethylene Type of Sampler grab

Type and Model of Analytical Equipment used

YSI model 35 conductance meter

Field measurements made at ambient temperature (recorded).

Modifications/Adjustments of Method

Typical Resolution 1 microSiemen/cm.

SORRELLS RESEARCH ASSOCIATES, INC
8002 Stanton Road
Little Rock AR 72209

PARAMETER SHEET

Parameter SULFATE

Method Turbidimetric

Reference Standard Methods, 16th Edition 426C

Primary Analyst Pennye Derryberry

Normal Holding Time 2 to 7 days Preservative Cool 4. C

Type of Container polyethylene Type of Sampler grab

Type and Model of Analytical Equipment used

Sargent Welch turbidimeter

Modifications/Adjustments of Method

Typical Detection Limit 0.5 mg/liter.

SORRELLS RESEARCH ASSOCIATES, INC
8002 Stanton Road
Little Rock AR 72209

PARAMETER SHEET

Parameter SULFITE

Method Iodometric

Reference Standard Methods, 16th Edition 428A

Primary Analyst Cecil Sorrells

Normal Holding Time none Preservative 1 ml EDTA solution/100ml

Type of Container polyethylene Type of Sampler grab

Type and Model of Analytical Equipment used

Brinkman digital buret

Modifications/Adjustments of Method

Typical Detection Limit 0.05 mg/liter.

SORRELLS RESEARCH ASSOCIATES, INC
8002 Stanton Road
Little Rock AR 72209

PARAMETER SHEET

Parameter SULFIDE

Method Photometric methylene blue method

Reference Standard Methods, 16th Edition 427C

Primary Analyst Pennye Derryberry

Normal Holding Time 4 to 6 hours Preservative 4 gtt 2N zinc acetate/dl

Type of Container polyethylene Type of Sampler grab

Type and Model of Analytical Equipment used

Sequoia turner model 390 spectrophotometric

Modifications/Adjustments of Method

Typical Detection Limit < 0.01 mg/liter.

SORRELLS RESEARCH ASSOCIATES, INC
8002 Stanton Road
Little Rock AR 72209

PARAMETER SHEET

Parameter TEMPERATURE

Method Electrometric

Reference Standard Methods, 16th Edition 212

Primary Analyst C. A. Sorrells

Normal Holding Time on site Preservative analyze immediately

Type of Container polyethylene Type of Sampler grab

Type and Model of Analytical Equipment used

Cole Parmer Model 5850 pH/Ion/Temperature Meter.

Modifications/Adjustments of Method

~~Calibrated with a National Bureau of Standards certified thermometer before field use.~~

Typical Resolution < 1. Centigrade.

SORRELLS RESEARCH ASSOCIATES, INC
8002 Stanton Road
Little Rock AR 72209

PARAMETER SHEET

Parameter ARSENIC - TOTAL

Method Digestion followed by hydride

Reference Standard Methods 16th. Edition, 303E

Primary Analyst Ed Sorrells II

Normal Holding Time 2 to 7 days Preservative HNO_3

Type of Container polyethylene Type of Sampler grab

Type and Model of Analytical Equipment used

Atomic Absorption Spectrophotometer

Instrumentation Laboratory Model 251

Buck Scientific Hydride Generator

Modifications/Adjustments of Method

Typical Detection Limit < 0.005 mg/liter.

SORRELLS RESEARCH ASSOCIATES, INC
8002 Stanton Road
Little Rock AR 72209

PARAMETER SHEET

Parameter ALUMINUM - TOTAL

Method Digestion followed by AA direct aspiration

Reference Standard Methods 16th. Edition, 303C

Primary Analyst Edward Sorrells II

Normal Holding Time 2 to 7 days Preservative Cool 4. C HNO3

Type of Container polyethylene Type of Sampler grab

Type and Model of Analytical Equipment used

Atomic Absorption Spectrophotometer

Instrumentation Laboratory Model 251

Modifications/Adjustments of Method

~~Typical Detection Limit < 0.04 mg/liter.~~

SORRELLS RESEARCH ASSOCIATES, INC
8002 Stanton Road
Little Rock AR 72209

PARAMETER SHEET

Parameter CADMIUM - TOTAL

Method Digestion followed by AA direct aspiration

Reference Standard Methods 16th. Edition, 303A

Primary Analyst Ed Sorrells II

Normal Holding Time 2 to 7 days Preservative HNO_3

Type of Container polyethylene Type of Sampler grab

Type and Model of Analytical Equipment used

Atomic Absorption Spectrophotometer

Instrumentation Laboratory Model 251

Modifications/Adjustments of Method

Typical Detection Limit < 0.002 mg/liter.

SORRELLS RESEARCH ASSOCIATES, INC
8002 Stanton Road
Little Rock AR 72209

PARAMETER SHEET

Parameter CHROMIUM - TOTAL

Method Digestion followed by AA direct aspiration

Reference Standard Methods 16th Edition, 303A

Primary Analyst Ed Sorrells II

Normal Holding Time 2 to 7 days Preservative HNO_3

Type of Container polyethylene Type of Sampler grab

Type and Model of Analytical Equipment used

Atomic Absorption Spectrophotometer

Instrumentation Laboratory Model 251

Modifications/Adjustments of Method

Typical Detection Limit < 0.005 liter.

SORRELLS RESEARCH ASSOCIATES, INC
8002 Stanton Road
Little Rock AR 72209

PARAMETER SHEET

Parameter LEAD - TOTAL

Method Digestion followed by AA direct aspiration

Reference Standard Methods 16th Edition, 303A

Primary Analyst Ed Sorrells II

Normal Holding Time 2 to 7 days Preservative HNO_3

Type of Container polyethylene Type of Sampler grab

Type and Model of Analytical Equipment used

Atomic Absorption Spectrophotometer

Instrumentation Laboratory Model 251

Modifications/Adjustments of Method

Typical Detection Limit < 0.01 mg/liter.

SORRELLS RESEARCH ASSOCIATES, INC
8002 Stanton Road
Little Rock AR 72209

PARAMETER SHEET

Parameter MERCURY - TOTAL

Method Cold vapor manual

Reference Standard Methods 16th Edition, 303F

Primary Analyst Ed Sorrells II

Normal Holding Time 2 to 7 days Preservative HNO3 in glass

Type of Container polyethylene Type of Sampler grab

Type and Model of Analytical Equipment used

Atomic Absorption Spectrophotometer -

Buck Scientific cold vapor accessary

Instrumentation Laboratory Model 251

Modifications/Adjustments of Method

Typical Detection Limit < 0.0005 mg/liter.

SORRELLS RESEARCH ASSOCIATES, INC
8002 Stanton Road
Little Rock AR 72209

PARAMETER SHEET

Parameter ETHYLENE DICHLORIDE

Method Purge and Trap Gas Liquid Chromatography - EPA 601

Reference Environmental Protection Agency 40 CFR Part 136

Primary Analyst K. E. Sorrells

Normal Holding Time 14 days Preservative Cool 4.C

Type of Container Glass TLS Type of Sampler grab

Type and Model of Analytical Equipment used

Tekmar LSC-2 Purge-and-Trap Concentrator

Tracor 560 Temperature-Programmable Gas-Liquid Chromatograph

Hall Electolytic Conductivity Detector

Modifications/Adjustments of Method

Typical Detection Limit < 0.0002 mg/liter.

SORRELLS RESEARCH ASSOCIATES, INC
8002 Stanton Road
Little Rock AR 72209

PARAMETER SHEET

Parameter METHYL ISOBUTYL KETONE

Method Gas Chromatography - Mass Spectrometry EPA 625

Reference Environmental Protection Agency 40 CFR Part 136

Primary Analyst K. E. Sorrells

Normal Holding Time 7 days/40 days Preservative Cool 4.C

Type of Container Amber Glass TLF Type of Sampler grab

Type and Model of Analytical Equipment used

Hewlett Packard 5890A Gas Chromatograph

Hewlett Packard 5970B Mass Selective Detector

Hewlett Packard 310 MicroComputer as Controller -

Configured as the Hewlett Packard MS ChemStation.

Modifications/Adjustments of Method

Solid Phase Extraction per EPA Method 3560.

Selective Ion Monitoring Data Acquisition.

Typical Detection Limit < 0.01 mg/liter.

SORRELLS RESEARCH ASSOCIATES, INC
8002 Stanton Road
Little Rock AR 72209

PARAMETER SHEET

Parameter MESITYL OXIDE

Method Gas Chromatography - Mass Spectrometry EPA 625

Reference Environmental Protection Agency 40 CFR Part 136

Primary Analyst K. E. Sorrells

Normal Holding Time 7 days/40 days Preservative Cool 4.C

Type of Container Amber Glass TLC Type of Sampler grab

Type and Model of Analytical Equipment used

Hewlett Packard 5890A Gas Chromatograph

Hewlett Packard 5970B Mass Selective Detector

Hewlett Packard 310 MicroComputer as Controller -

Configured as the Hewlett Packard MS ChemStation.

Modifications/Adjustments of Method

Solid Phase Extraction per EPA Method 3560.

Selective Ion Monitoring Data Acquisition.

Typical Detection Limit < 0.001 mg/liter.

SORRELLS RESEARCH ASSOCIATES, INC
8002 Stanton Road
Little Rock AR 72209

PARAMETER SHEET

Parameter TOLUENE

Method Purge and Trap Gas Liquid Chromatography - EPA 602

Reference Environmental Protection Agency 40 CFR Part 136

Primary Analyst K. E. Sorrells

Normal Holding Time 14 days Preservative Cool 4.C

Type of Container Glass TLS Type of Sampler grab

Type and Model of Analytical Equipment used

Tekmar LSC-2 Purge-and-Trap Concentrator

Tracor 560 Temperature-Programmable Gas-Liquid Chromatograph

Flame Ionization Detector

Modifications/Adjustments of Method

Typical Detection Limit < 0.0005 mg/liter.

SORRELLS RESEARCH ASSOCIATES, INC
8002 Stanton Road
Little Rock AR 72209

PARAMETER SHEET

Parameter XYLENES

Method Purge and Trap Gas Liquid Chromatography - EPA 602

Reference Environmental Protection Agency 40 CFR Part 136

Primary Analyst K. E. Sorrells

Normal Holding Time 14 days Preservative Cool 4.C

Type of Container Glass TLS Type of Sampler grab

Type and Model of Analytical Equipment used

Tekmar LSC-2 Purge-and-Trap Concentrator

Tracor 560 Temperature-Programmable Gas-Liquid Chromatograph

Flame Ionization Detector

Modifications/Adjustments of Method

Includes meta-, ortho-, and para- isomers.

Use EPA Method 601 column for confirmation.

Typical Detection Limit < 0.0005 mg/liter.

SORRELLS RESEARCH ASSOCIATES, INC
8002 Stanton Road
Little Rock AR 72209

PARAMETER SHEET

Parameter: ISOPHORONE

Method: Gas Chromatography - Mass Spectrometry EPA 625

Reference: Environmental Protection Agency 40 CFR Part 136

Primary Analyst: K. E. Sorrells

Normal Holding Time: 7 days/40 days Preservative: Cool 4.C

Type of Container: Amber Glass TLC Type of Sampler: grab

Type and Model of Analytical Equipment used

Hewlett Packard 5890A Gas Chromatograph

Hewlett Packard 5970B Mass Selective Detector

Hewlett Packard 310 MicroComputer as Controller -

Configured as the Hewlett Packard MS ChemStation.

Modifications/Adjustments of Method

Solid Phase Extraction per EPA Method 3560.

Selective Ion Monitoring Data Acquisition.

Typical Detection Limit < 0.001 mg/liter.

SORRELLS RESEARCH ASSOCIATES, INC
8002 Stanton Road
Little Rock AR 72209

PARAMETER SHEET

Parameter DIMETHYL ACETAMIDE

Method Gas Chromatography - Mass Spectrometry EPA 625

Reference Environmental Protection Agency 40 CFR Part 136

Primary Analyst K. E. Sorrells

Normal Holding Time 7 days/40 days Preservative Cool 4.C

Type of Container Amber Glass TLC Type of Sampler grab

Type and Model of Analytical Equipment used

Hewlett Packard 5890A Gas Chromatograph

Hewlett Packard 5970B Mass Selective Detector

Hewlett Packard 310 MicroComputer as Controller -

Configured as the Hewlett Packard MS ChemStation.

Modifications/Adjustments of Method

Solid Phase Extraction per EPA Method 3560.

Selective Ion Monitoring Data Acquisition.

Typical Detection Limit < 0.01 mg/liter.

SORRELLS RESEARCH ASSOCIATES, INC
8002 Stanton Road
Little Rock AR 72209

PARAMETER SHEET

Parameter: 3,4-DICHLOROANILINE

Method: Gas Chromatography - Mass Spectrometry EPA 625

Reference: Environmental Protection Agency 40 CFR Part 136

Primary Analyst: K. E. Sorrells

Normal Holding Time: 7 days/40 days Preservative: Cool 4.C

Type of Container: Amber Glass TLC Type of Sampler: grab

Type and Model of Analytical Equipment used

Hewlett Packard 5890A Gas Chromatograph

Hewlett Packard 5970B Mass Selective Detector

Hewlett Packard 310 MicroComputer as Controller -

Configured as the Hewlett Packard MS ChemStation.

Modifications/Adjustments of Method

Solid Phase Extraction per EPA Method 3560.

Selective Ion Monitoring Data Acquisition.

Typical Detection Limit < 0.01 mg/liter.

SORRELLS RESEARCH ASSOCIATES, INC
8002 Stanton Road
Little Rock AR 72209

PARAMETER SHEET

Parameter PROPANIL

Method Gas Chromatography - Mass Spectrometry EPA 625

Reference Environmental Protection Agency 40 CFR Part 136

Primary Analyst K. E. Sorrells

Normal Holding Time 7 days/40 days Preservative Cool 4.C

Type of Container Amber Glass TLC Type of Sampler grab

Type and Model of Analytical Equipment used

Hewlett Packard 5890A Gas Chromatograph

Hewlett Packard 5970B Mass Selective Detector

Hewlett Packard 310 MicroComputer as Controller -

Configured as the Hewlett Packard MS ChemStation.

Modifications/Adjustments of Method

Solid Phase Extraction per EPA Method 3560.

Selective Ion Monitoring Data Acquisition.

Typical Detection Limit < 0.01 mg/liter.

SORRELLS RESEARCH ASSOCIATES, INC
8002 Stanton Road
Little Rock AR 72209

PARAMETER SHEET

Parameter PHENOL

Method Gas Chromatography - Mass Spectrometry EPA 625

Reference Environmental Protection Agency 40 CFR Part 136

Primary Analyst K. E. Sorrells

Normal Holding Time 7 days/40 days Preservative Cool 4.C

Type of Container Amber Glass TLC Type of Sampler grab

Type and Model of Analytical Equipment used

Hewlett Packard 5890A Gas Chromatograph

Hewlett Packard 5970B Mass Selective Detector

Hewlett Packard 310 MicroComputer as Controller -

Configured as the Hewlett Packard MS ChemStation.

Modifications/Adjustments of Method

Solid Phase Extraction per EPA Method 3560.

Selective Ion Monitoring Data Acquisition.

Typical Detection Limit < 0.01 mg/liter.

SORRELLS RESEARCH ASSOCIATES, INC
8002 Stanton Road
Little Rock AR 72209

PARAMETER SHEET

Parameter: TOTAL ORGANIC HALIDE

Method: Carbon-Trap/Combustion/Electrolytic Conductivity

Reference: SW-846, Section 5, Method 9020

Primary Analyst: K. E. Sorrells

Normal Holding Time: 7 days/40 days Preservative: Cool 4.C

Type of Container: Amber Glass TLC Type of Sampler: grab

Type and Model of Analytical Equipment used:

Hall Model 700A Electrolytic Conductivity Detector.

Modifications/Adjustments of Method:

Typical Detection Limit < 0.003 mg/liter.

FIELD RECORDS

CHAIN OF CUSTODY RECORD

NAME OF COMPANY, CITY, OR PROJECT: CEDAR CHEMICAL CO.

SAMPLERS: (signature) K.E. Sorrells / [illegible]

SAMPLE COLLECTION LOCATION	DATE	TIME	COMP	GRAB	NO. OF CONTAINERS	ANALYSIS REQUIRED
Field Point # 1	1-15	1110		✓	6	*
2	1-15	1145		✓	6	*
3	1-15	1207		✓	6	*
4	1-15	1255		✓	6	*
5	1-15	1230		✓	6 + 6	* Field Replicate
6	1-15	1320		✓	6	*
7	1-15	1300		✓	6	*
8	1-15	1340		✓	6	*
9	1-15	1405		✓	6 + 6	* Field Replicate

J.E. [illegible] - CEDAR Chemical Corp
JAN 15, 1988
RELINQUISHED BY: (signature)

RECEIVED BY: (signature) K.E. Sorrells
DATE/TIME 1425 JAN 15, 1988

DISPATCHED BY: (signature) [signature]

RECEIVED FOR LABORATORY BY: [signature]
DATE/TIME 1/15/88 5 pm

Method of Shipment: (CIRCLE ONE) UPS BUS WALK-IN SRA COURIER OTHER COURIER

* per proposal schedule

NOTES: (1) : SW. Equalization EQ pond 25' E of Influent pipe. (2) 60' N of SW corner (3) 125' N (4) 100' N of SE EQ pond (5) 160' N (6) Aer. P. Discharge Pipe (7) Recycle Sludge from Aer. P. Clarifier (8) 25' N of SW Final Pond (9) 125' N of SE Final

No - 83

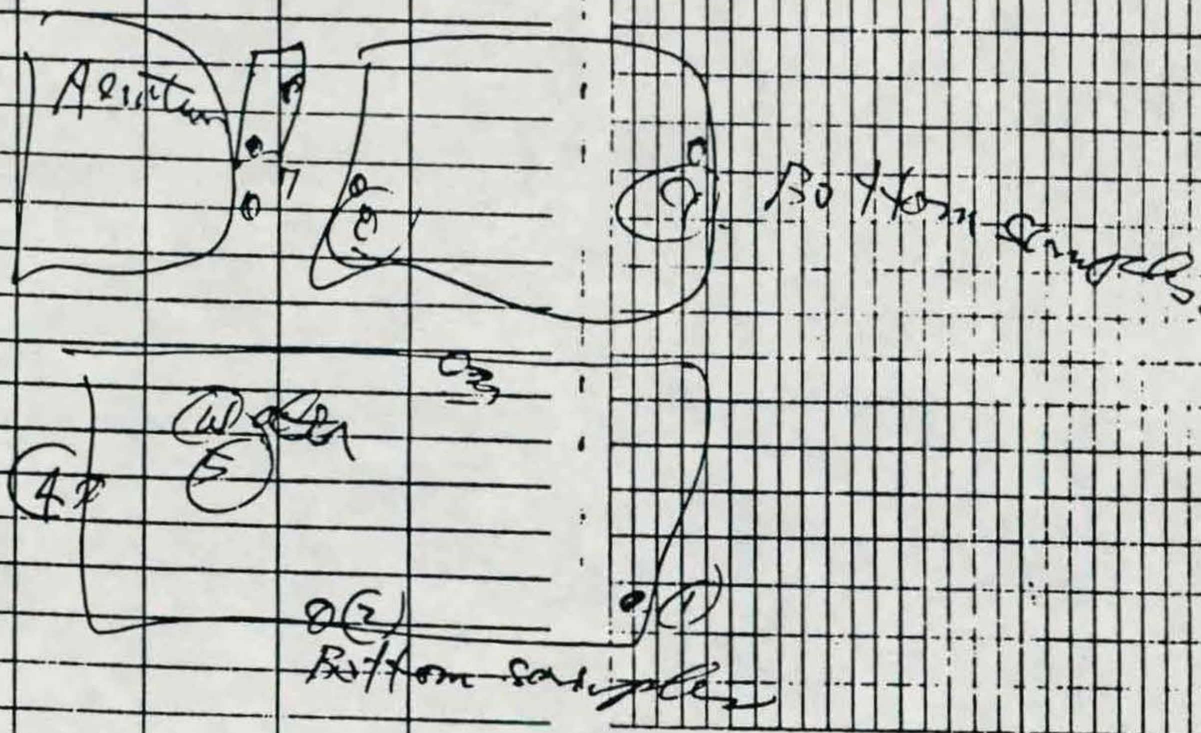
SORRELLS RESEARCH ASSOCIATES, INC.

25'
From
South Corner Inf
#1

Cedar Chem 44' from

-15-88
1110AM

pH	Temp°C	Cond
734	5.5	8500



40' North
SW Corner

#2					
1-15-88			pH	Temp °C	Cond
11:45			6.58	4.5	800

Cedar

46 from ro

125' from	North corner	East			
#3					
1-15-85			PH	Temp	Cond
12:10			6.83	6.0	890

100' along water line
South of Northwest corner

Cedar Chem

# 4					
6-15-87					
1255pm			pH	Temp	Cond
			6.58	5.8	890

160' Along water line Right of road
North side of pond from North east corner

water					
#5		Dup #1	pH	temp	cond
4-5-83		D	6.69	6.0	720
1230PM		Dup #2	pH	temp	cond
			6.72	5.5	700

Aeration pond discharge pipe tap water

#6

1-13-83

120pm

			Ph	Temp	cond
			8.25	2.2	11000

Recycled sludge FROM clarifier

sludge			Collected by		
# 7			J. Porter		
1PM			Dale Kramer		
1-15-87			PH	Temp	Cond
			7.84	6.2	11500

25' north of Sludge	southwest corner Final pond			
# 8				
1-15-87		pH	Temp	Cond
1 40 PM		7.01	4.5	1900

125' North of SE corner of Final pond

J. Po...r

W/B

#9					
1-15-88		Rep 1	Ph	Temp	Cond
205 PM			6.83	3.9	1350
		Rep 2	pH	Temp	Cond
			6.94	2.5	1320 -

TABLE OF CONTENTS

QUALITY ASSURANCE PLAN FOR NPDES MONITORING AND WASTELOAD EVALUATION STUDIES

NPDES MONITORING FOR ARKANSAS CITIES AND INDUSTRIES

QUALITY ASSURANCE PLAN BY SORRELLS RESEARCH ASSOCIATES, INC.

* LABORATORY *

APPROVAL:

U.S. EPA Quality Control Coordinator.....................Date.................

ADPC&E Grants Supervisor................................Date.................

ADPC&E QA Officer.......................................Date.................

SR Laboratory Officer...................................Date.................

SR Quality Assurance Officer............................Date.................

DISTRIBUTION OF APPROVED QA PROJECT PLAN:

1. Ms. Bonnie S. Romo, QA Coordinator, EPA Region VI
2. Mr. Larry Wilson, Grants Supervisor, ADPC&E
3. Mr. Richard Thompson, QA Officer, ADPC&E
4. Project Engineer, Roy F. Weston, Inc.
5. Mr. Nick Dawson, ETC, Inc.
6. Cecil Sorrells, Quality Assurance Officer, Sorrells Research Associates, Inc.
7. Harry Beyer, Lab Production, Sorrells Research Associates, Inc.
8. K. E. Sorrells, Consulting Chemist, President, Sorrells Research Associates, Inc.

PROJECT DESCRIPTION

A typical stream study is described below. On NPDES monitoring, SORRELLS RESEARCH typically provides sample transportation on a scheduled weekly basis, according to geographic location, and prompt professional analysis for routine wastewater parameters.

***

This project comprises stream wasteload evaluations performed by the WLE Consultants to determine and/or justify the need for AWT for the City of Monticello.

The Monticello Northwest Wastewater Treatment Facility discharges into Godfrey Creek at Mile 9, Godfrey Creek flows into Lower Cut-Off Creek at Mile 6.

The Monticello Southwest Treatment Facility discharges into Ten Mile Creek, which flows into the Saline River at Mile 49.

The studies are to include modeling for Critical D.O. Deficit, Model Calibration, and Model Verification. It is expected that field work will extend the extent of the recovery from the discharges associated with the Treatment Facilities.

Samples are to be taken to represent early morning conditions and mid-afternoon conditions. Sample points are selected to represent the effective reach of pollution and recovery from the discharges associated with the Treatment Facilities.

A repeat sampling survey will be made 2 to 4 weeks following the Calibration sampling period.

The critical water quality parameters are further specified in Section 9.

The overall project plan is to model the discharge of the given POTW('S), with its (their) receiving streams for these critical water quality parameters for the purpose of demonstrating (predicting) the level of treatment (AWT or Secondary) that will be adequate, within the limits of the State Stream Water Quality Criteria. The sampling period is intended to approximate the critical conditions of simultaneosly-occurring low flow and high temperature.

The ADPC&E has contracted with Roy F. Weston, Inc. Consulting Engineers, perform the field work, modeling and report. ETC, Inc., will actually perform the field work for Weston. In turn, the Laboratory Analysis for these Projects will be performed by Sorrells Research Associates, Inc. The responsibility for Laboratory Quality Assurance will be entirely that of SRA, who will also render assistance and counsel in ensuring validity of field procedures.

The key personnel involved in the Project, their project responsibility, and communication ine per these studies are shown in Figure 1.

Project Engineer

Roy F. Weston, Inc.
Arun K. Deb

(CLIENT)

Harry Beyer
Lab Production

Ed Sorrells
Consultant & Supervisor

Cecil Sorrells
QA & Routine Services

Vern Mahaffey
Transport

Lorra Sorrells
Glassware & Technical

June Sorrells
Transport

Diana Goforth
Report Output

Figure 1. Project Organization and Responsibility.

WATER QUALITY LABORATORY ORGANIZATION

LABORATORY SUPERVISOR - ED SORRELLS

Digestions
Distillations
Field Studies Supervisor

SENIOR TECHNICIAN - HARRY BEYER

Bacteriological Analysis
Mineral Analysis
Nutrient Analysis
Trace Metals Analysis

TECHNICIAN II - CECIL SORRELLS

Demand Analysis
Electrode Procedures
Q. A. Officer

TECHNICIAN II - LORRA SORRELLS

Benthic Demand
Biomass Analysis
Field Studies Aide
Physical Analysis

All laboratory work will be performed by SORRELLS RESEARCH personnel. SR operates a facility including 4000 sq. ft. of laboratory, office, and storage space on a two acre wooded site, one block from Interstate 30, centrally-located in Pulaski County, Arkansas.

PROJECT ORGANIZATION AND RESPONSIBILITIES

(continued)

DISCUSSION OF PROJECT QA PLAN

Sections 3 and 4 outline the justification for the Project, what, in general, is involved, and the responsibilities assumed by the respective organizations involved. Figure one shows the key personnel of the Project and their responsibilities. Section 9 specifies the field and laboratory determinants and procedures which are performed in the Project. Section 6, sub-paragraphs a- through h specify good field practices for the Project.

To recapitulate, therefore; the TASK is to model the discharge of the given POTW('S) with its (their) receiving stream(s) for the critical water quality parameters under the critical conditions of simultaneously-occurring low flow and high temperature, for the purpose of demonstrating (predicting) the level of treatment that will be adequate. The model is prepared by characterizing the water quality and physical determinants extant at a time of low flow. The laboratory analyses include most of the parameters tabulated in Section 9. The attachment to our reference letter illustrates a specific protocol for field replication and spiking of samples as they are collected.

The tasks undertaken by this laboratory will cover four sets of samples for the water quality parameters described in Section 9, which must be performed in a timely manner also. More than 1200 Dissolved Oxygen measurements must be performed in determining the B.O.D. series, for example.

In general, by the use of precision and accurate data, we can quantify the limits of confidence in laboratory measurement, just as the laboratory measures the determinants themselves.

The whole purpose of the QA PLAN is to ensure the validity and reliability of the data generated and reported. Since we are characterizing environmental (and laboratory) conditions by means of SAMPLING, statistical processes apply. Also, we must balance time and expense applied to these determinations versus the precision and accuracy required. This QA PLAN states what are believed to be reasonable limits for Quality Assurance for determing these critical water quality parameters.

QA OBJECTIVES IN TERMS OF PRECISION, ACCURACY, COMPLETENESS, REPRESENTATIVENESS AND COMPARABILITY

The objective of the quality assurance plan is to provide data that is as complete as possible with the precision and accuracy necessary to accomplish characterization and modeling and to base decisions for Facility planning.

The following QA objectives for precision, accuracy and completeness have been used in the design of this study.

A. PRECISION: The routine non-biological analytes routinely determined by Sorrells Research are expected to be determined with a precision (coefficient of variation) of 5 percent, 95 percent of the time. For biological analytes, Sorrells Research expects to determine these within a precision of 20 percent, 80 percent of the time.

B. ACCURACY: Reference sample determinations made during the period of this study should be within 10 percent of the true value, except at the limits of detection of the analyte per standard method procedure. These relationships are to be shown subsequently by computer-generated tabulation and/or graphic plot. Control limits based upon the percent recovery of spiked samples should be in the range of 90 to 110 percent as determined by the procedures of Section 14.

C. COMPLETENESS: Ninety (90) percent of all possible measurement data should be valid. Completeness of data, the amount of valid data obtained compared to the amount expected, requires attention and expertise from both field and laboratory personnel. Care is to be taken to ensure proper sample collection, to avoid sample contamination, and to mininmize out-ot-control analytical procedures that would cause loss of data.

D. REPRESENTATIVENESS: Sampling sites will be determined by the WLE Consultants following field reconnaissance, so selected to be valid and representative sites. Sorrells Research will furnish field support as required, and will advise and concur in sampling procedures, containers and preservation.

E. COMPARABILITY: All of the elements listed in this Section will serve in assuring comparability of data. The methods used are described in Section 9. These methods have been tested and approved for the applications required. Standard units of reporting will be used in every case.

SAMPLING PROCEDURES

The following rules are to be used in these studies:

A. A minimum number of trained persons are to be involved in sample collection and handlir

B. The particular samples to be collected in this study are treated wastewater effluent ar receiving stream samples to be collected in this study are treated wastewater effluent and receiving stream samples at specified sample locations. Effluent samples are to be collectec a point that ensures well-mixed sample homogeneity, such as a point of free-fall, if possible stream samples are to be collected so as to fairly represent the cross-section of the flowinç stream at that point. Generally collect stream samples at mid-depth or five-foot-depth, whichever is lesser. All samples in general are to be preserved (short-term) by chilling the closed collection containers in durable ice chests with crushed ice, immediately following collection. The Laboratory Supervisor will advise on any special requirements required by particular circumstances, in general, it will be advisable to adhere to chilling with crushed ice alone for immediate field preservation, and allow the laboratory to coordinate needs for longer-term preservation.

C. Handle samples as little as possible.

D. Use non-contaminating sampling eguipment and devices for effluent and stream samples, including the Wheaton Grab Sampler, the APHA Sampler, and the Kemmerer Water Bottle.

E. Attach sample tag securely to the sample container at the time the sample is collected. Record the serial number of the tag, the station number and location, the date and time collected, the type of sample, the sequence number, the preservative used, the analyses required, and the name of the collector. Complete tag information legibly in waterproof labeling.

F. Use bound field books to record field measurements and other information necessary to document the sample collection processes. The standard format is to include the serial numbe of the field sheet, date, time, survey, type of sample taken, volume of each sample, code for sample analyses, unigue sample number, sampling location, field measurements including D.O., Temp., Conductivity, and pH. The entries are to be signed by the sample collector and the responsibility for preparing and retaining field books are to be that of the study coordinato or his designated representative.

G. The sample collector is physically responsible for the sample until its custody is relinquished to the receiving laboratory or assigned custodian, that is, it must be in his vi at all times, or lock-stored where it cannot be tampered with.

H. It is recommended that color slides or equivalent photographs be made of the sampling ocations, and that documentary descriptive information be recorded to conclusively identify describe these photographs.

SAMPLE CUSTODY

This study will document and implement a chain of possession and custody of any sample collected, to insure that all are collected, transferred, stored, analyzed, and destroyed by authorized personnel. Samples will be accompanied by a Chain-of-Custody record that includes the name of the study, collector's signatures, station number, station location, data, time, type of sample, sequence number, number of containers, and analyses required.

The purpose of the Chain-of-Custody procedure is to establish an unbroken chain of connection for documentation by maintaining an accurate written record of source and possession of the samples through their analysis and ultimate report. This procedure is also intended to ensure that samples are collected, transferred, stored, analyzed and destroyed only by authorized, competent personnel.

A sample is in CUSTODY if it is in any one of the following states:

a. In actual physical possession.
b. In view, after being in physical possession.
c. In physical possession and locked up.
d. In a secure area, restricted to authorized personnel.

See also details of Section 6.

Laboratory personnel are responsible for the care and custody of a sample once it is handed to them and should retain the sample in their possession and view or secured in the laboratory at all times.

The laboratory area shall be maintained as secured area and shall be restricted to authorized personnel.

Once sample analyses are completed, the unused portion of the sample, with identifying labels and other documentation must be returned to the Laboratory Supervisor for secure storage.

Samples should be destroyed only upon the order of the Laboratory supervisor, in consultation with Project Officer. Sample tags, like all laboratory records, must be retained for three years.

* A typical sampling handling sequence is shown in the attached flowchart.

Sample
Collection

\/

Field Logging
Labeling and Complete
Chain-of Custody Documentation
and Request for Analysis

\/

Sample Preservation
Refrigeration, etc.

\/

Transportation
to Laboratory

\/

Sample Received at
Laboratory, Sign Off
Chain-of-Custody Document

\/

Log in Samples, Assign Lab
Log Numbers, Enter Pertinent
Data in Computer
Including Priority
and Hazard Information

\/

Store Sample Under Refrigeration,
Schedule Analyses, and Complete
Analyses

SAMPLE HANDLING FLOW DIAGRAM

(Contined)

\/

Complete Data
Summary Sheet

\/

Review of Results
by Lab Q.A. Officer

\/

Report of Results
to Project Manager

\/

Return of Unused Sample to Client if Required >> Client Report >> Discard Sample 30 Days After Client Accepts Data

SAMPLE HANDLING FLOW DIAMGRAM

CALIBRATION PROCEDURES

All instruments and equipment will be calibrated according to the manufacturer's recommended procedures and the guidelines in the HANDBOOK FOR ANALYTICAL QUALITY CONTROL IN WATER AND WASTEWATER LABORATORIES, EPA-600/4-79-019. In addition, the following specific procedures wil be followed.

A. All analytical balances will be checked each week with a set of Class S weights. The reading of each weight should be recorded on the Balance Quality Assurance form.

B. All pH meters will be calibrated, immediately prior to use, with two buffer solutions. Buffers used should span the expected range of pH and alkalinity determinations. All buffers used must be standardized against standards of the National Bureau of Standards. The pH meter must be recalibrated after each two hours of use.

C. All conductivity meters must be calibrated before each use against Standard 0.01 Molar Potassium Chloride at 25.0 C. Four portions of solution are to be used, temperature adjusted in a water bath. The conductivity cell is rinsed in the first three portions, and the resistance, R, of the fourth portion measured. The cell constant is given by the question:

$$Kc = Rs \times 0.001413$$

D. All turbidimeters must be calibrated before each use using turbidity standards prepared as in Standard Methods 15th Edition, page 133. Standards of 40, 4.0 and 0.4 NTU should be prepared to calibrate the 0-100, 0-10, 0-1.0 scales, respectively.

E. All dissolved oxygen meters must be calibrated before each use using air calibration and water calibration, using water with a known oxygen concentration and water with zero dissolved oxygen. Water for calibration must be prepared by filling four B.O.D. Bottles from well mixed water from an air-free collapsible container. The D.O. of 1st and 3rd bottles are determined using the Winkler Azide method. The remaining bottles are used to calibrate the meter to average of the pairs, in each case. This calibration must agree with the air calibration. The air calibration consists of placing the electrode into a bottle with a small amount of

CALIBRATION PROCEDURES

(Continued)

water in the bottom. The electrode must be in the air above the water. Read the temperature after the system reaches equilibrium and determine the oxygen saturation at that temperature, corrected for the altitude and vapor pressure of water.

F. All thermometers will be checked against a thermometer certified by the National Bureau of Standards before being used and at least once annually. The check should include at least three temperature settings in the range from 4 to 30 . C, preferably at 4, 15, and 30 C.

G. All spectrophotometers must be checked for proper wavelength and spectral transmittance annually.

H. The atomic absorption spectrophotometer must be calibrated daily for each group of samples. Series of five standards plus a reagent blank, in the linear response concentration range, should be used. Baseline drift is checked with a reagent blank after not more than five samples. Instrument calibration is checked with midpoint standards preceding and following the blank.

Proper instrument operation should be verified by running a replicate sample and a spiked sample in each set of ten samples.

Instruments and methods used in this study will be calibrated daily for each set of samples as a part of the analytical process.

All procedures involving calibration utilize Class A volumetric glassware, Primary Standard Grade reagents, and/or other NBS-traceable materials or devices.

Records of preparation of standards are maintained in a permanently bound record book.

ANALYTICAL PROCEDURES

All samples are to be collected, preserved, and analyzed in accordance with the 16th Edition of Standard Methods for Examination of Water and Wastewater. The following laboratory and field methods will be used in this study.

STANDARD METHOD REFERENCES

PARAMETER	METHOD NO.	PAGE NO.
BOD	507	525 - 532
TSS	209C	96 - 97
FECAL COLIFORM	909C	896 - 898
[illegible]	423	429 - 437
ALKALINITY	403	269 - 273
CHLORINE RESIDUAL	408D	306 - 309
NH3N	417C/E	382 - 386
TKN	420A (MOD.)	408 - 410
TOTAL P	424CIII/F	442-444/448/450
SOL. ORTHO-P	424A/F	441/448 - 450
NO3N	418C	394 - 398
NO2N	419	404 - 406
CHLOROPHYLL A	802G4,2/1002G	731-733/106-1072

STANDARD METHOD REFERENCES

(Continued)

PARAMETER	METHOD NO.	PAGE NO.
TOTAL SOLIDS	209A	93 - 94
CHLORIDE	407B	288 - 290
SULFATE	426C	467 - 468
[illegible]	421B/F	418-419/421-425
TEMP	212	126 - 127

DATA ANALYSIS, VALIDATION, AND REPORTING

DATA ANALYSIS: Conditions of analyses and responses of blanks, samples, and standards are recorded on worksheet designed to accomodate related types of analyses. (See Appendices.)

Date and time are entered on these worksheets and initials of analyst by analyst.

Calculations are made on the Sorrells Research mini-computer and routine reports are printed out from programs developed internally by Sorrells Research. (See Appedices.)

The general equation for calculations of determinants in the linear range of response is:

$$Cu = Ru/Rs \times Cs \times Vs/Vu$$

where Cu, Cs equal concentrations of Unknown & Standard, respectively Ru, Rs equal responses of Unknown & Standard, respectively Vu, Vs equal volumes of Unknown & Standard, respectively

TA VALIDATION: The integrity of the data generated will be validated at several points ıring the collection, analytical, and reporting process. The two principal check points are the laboratory quality control checks and the data processing checks made during preparation of data for client summary sheets and/or computer files.

The laboratory control checks are described in Sections 11 and 14. These checks consist of the use of field replicates, laboratory replicates, and spiked replicates to monitor the levels of precision and accuracy of the collection and analytical processes.

Data developed will be reviewed by K. E. Sorrells, while Q.A. Work will be presented by the QA officer, in comparison to the previously stated QA objectives of this study.

OUTLIERS: Outliers from the laboratory quality control checks indicate sampling or analytical problems.

Any questionable determinations will be repeated; such questioned data that cannot be thus resolved will be invalidated.

All outliers from data processing and/or report print-outs will be checked against the original worksheets.

DATA FLOW: See Section 7 for a diagram of sample handling and information processing.

REPORTING: Field and laboratory data are reported to client and/or his Consultants completion of Time-Series determinations, usually five days after receipt of sample.

INTERNAL QUALITY CONTROL CHECKS

The quality of data from this laboratory will be assured by a system of internal checks. These include equipment checks, reagent checks, and laboratory performance checks. The results of these checks will be recorded to verify the operation of the quality control system and to document any changes that occur.

CHEMICAL LABORATORY:

A. The analytical balance will be checked with a set of Class S weights each week. The reading of each weight will be recorded on the balance quality assurance sheet.

B. The temperature of all B.O.D.incubators should be checked daily and recorded on the quality assurance check sheet. The temperature will be checked by measuring the temperature of a sealed B.O.D. bottle, filled with distilled water, kept in the incubator. The temperature should be measured to the nearest 0.1 C The temperature must be 20 +- 1.0 C at all times. Corrective acion, adjustment or repair must be taken if this temperature range is not met.

C. The temperature of the drying oven is to be checked daily and recorded on the quality assurance sheet. The correct settings are 105 C and 180 C for total suspended solids and total dissolved solids respectively. Certain reagent drying and specialty procedures require other temperatures such as 70 C, 120 C and 285 C. Corrective action, adjustment, or repair must be provided if measured temperatures are not correct.

D. The results of each pH calibration must be recorded on the quality assurance check sheet. If the electrode response to two buffers show differences greater than 0.1 pH unit, corrective action must be taken. If recalibration, cleaning the electrodes or changing the buffers does not bring the response within limits, the electrode is to be replaced.

INTERNAL QUALITY CONTROL CHECKS

(Continued)

e. The normality of all titrants used in the laboratory must be checked each week. for stable reagents, or with each use for less stable reagents, and thos used infrequently.

The normality of the sodium thiosulfate D.O. Titrant should be determined with Standard potassium biniodate as described in STANDARD METHODS, 15th Edition, page 271.

The normality of the EDTA titrant for total hardness whould be determined with Primary Standard Calcium Carbonate solution as described in STANDARD METHODS 15th Edition, page 198.

The distilled water should be monitroed weekly for specific conductance, Total Organic Carbon; and monthly for pH, NH3N, NO3 + NO2N, arsenic, cadmium chromium, copper, selenium, sodium, and zinc. The nitrogen analyses should be run using freshly deionized distilled water as a blank. The metals analyses, except sodium should be run be concentrating 2 liters distilled water to 100 ml. Sodium should be run using the best quality available deionized distilled water as a blank. These checks should be recorded on the distilled water quality assurance check sheet.

LABORATORY PERFORMANCE CHECKS:

The performance of the laboratory will be checked with a scheculed system of replicate samples replicate spiked samples, and performance evaluations from an outside source. The operations carried out during this study will be made in accordance with EPA publication 600/4-79-019, "Handbook for Analytical Quality Control in Water and Wastewater Laboratories", and Sections 101 through 105 of the AWWA/APHA/WPCF publication "Standard Methods for the Examination of Water and Wastewater", 15th Edition, (1981).

A. Replicate Samples

All analyses will be checked for precision by the analysis of replicate samples.

INTERNAL QUALITY CONTROL CHECKS

(Continued)

Replicate determinations will be made by a random selection process to ensure a statistical average of ten percent (10 %) replication. On field projects duplicate samples will be collected in the field by the person or team collecting samples. The results of replicate analysis must be recorded on th Quality Control Sheet (see Appendices) and on control charts prepared as described in Section 14.

B. Spiked Replicate Samples:

Of these randomly-selected replicates described above, on every other selection also will be added spiked replicates for accuracy and recovery studies.

This provides an additional 10 % effort devoted to this aspect of quality assurance for a total ot twenty percent (20 %).

It is believed that the random selection process used in this laboratory is appropriate for un-biased statistics, and is designed to remove any element of subjectivity from the selection of replicates in a sample series.

These spiked replicates will be prepared by adding a known amount fo the analyte to an aliquot of the replicate sample in a standard volume container.

Standard materials for analyst spiking will be reviewed immediatley following determination to ensure that trends are determined early and that necessary corrective action can be taken as soon as possible.

The results are recorded on Quality Control Sheets, and control charts prepared as described in Section 14.

C. Performance Evaluation samples from an outside source will be analyzed annually.

Either samples from EPA or its contractor or from a relable independent source will be used. The analyst should perform the analysis without knowing the expected values.

PERFORMANCE AND SYSTEM AUDITS

Performance and system audits will be performed annually.

Laboratory performance will be checked using audit samples. A sample for each water quality parameter will be analyzed and the results reviewed by State personnel.

The system audit will consist of an on-site evaluation by personnel from the State. The audit will include a review of: laboratory personnel, facilities and equipment, analytical methodology, field and laboratory quality control, and data handling.

Each set of samples daily will be accompanied by blank and standard determinations to ensure of response.

ystem of cross checks utilizing Primary Standards Grade reagents will be devised to ensure uracy of response.

In this manner, material that is used as a standard in one procedure, will appear as a determinant in another.

The laboratory facilities will be inspected annually by either the State of Arkansas Dept. of Pollution Control and Ecology personnel and/or the EPA, Region VI.

Standard Reference Materials furnished by EPA or their contractor will be analyzed or more frequently, according to specification.

This laboratory will also participate in inter-laboratory comparative studies such as conducted by the USGS or other qualified agencies or organizations.

The results of such outside performance checks will be available on request and provided as part of the QA report for each funded study.

Discrepancies discovered in the course of such audits will be subject to immediate corrective action.

PREVENTIVE MAINTENANCE

A. ANALYTICAL BALANCE:

The analytical balance must be cleaned weekly and immdiately after any chemical spills.

The balance table must be kept neat and cleaned after any spills. Any spills that might interfere with trace analyses must be immediately and thoroughly cleaned up.

The analytical balance is cleaned and checked annually by American Scientific Products Balance Service against weights certified by the National Bureau of Standards.

B. pH METER:

The pH electrodes are to be maintained by following the manufacturer's recommendations for electrolyte solutions and storage procedures.

The following spare materials are to be kept on hand.

1. glass pH electrode or combination electrode.
2. reference electrode.
3. electrolyte solutions.
4. pH 4 buffer
5. pH 7 buffer
6. pH 10 buffer

C. CONDUCTIVITY METER:

Conductivity cells are to be recleaned and replentized whenever the readings become erratic, when a sharp endpoint cannot be obtained, or when inspection shows fowling or that any of the platinum black has flaked off.

PREVENTIVE MAINTENANCE

(Continued)

D. DISSOLVED OXYGEN METERS:

The membrane/electrolyte module is to be inspected daily, with each usage. It is to be chang bimonthly or whenever resonse is sluggish or erratic or when the appearance of the internal solution shows fouling.

The following spare materials are to be maintained on hand.

1. membrane/electrolyte modules

2. dry cell for probe

3. spare funnel/stirrer

4. dry cells for portable meter

E. TURBIDIMETER:

Cuvets must be clean and free of scratches in the critical area. Cuvets are to be cleaned by washing in a detergent solution then thoroughly rinsing with distilled water.

The following spare materials should be kept on hand.

1. light source

2. sample cell

F. WATER DISTILLATION UNIT:

Each day drain the still completely while hot, and flush the water line by opening the supply alve full open for a few minutes.

PREVENTIVE MAINTENANCE

(Continued)

F. WATER DISTILLATION UNIT:

Close the drain clamp and refill the constant-level reservoir, then adjust the supply water flow to trickle setting.

Operate the still for several minutes, wasting the condensate, then drain and set for normal operation.

Follow the manufacturer's directions for operation and weekly cleaning.

. ATOMIC ABSORPTION SPECTROPHOTOMETER:

The preventive maintenance schedule for the IL251 AA/AE is organized in a daily, weekly, monthly, semi-annual and annual format. Also included is a log sheet to record the maintenan performed. This schedule is outlined in the Appendixes to this QAP,

1. replacement fuse kit - Part No. IL20869
2. spare pre-mis O-ring kit - Part No. IL44179
3. spare frangible diaphrams - Part No. IL61046
4. spare glass beads - Part No. IL42234
5. spare glow plug - Part No. I144062

PREVENTIVE MAINTENANCE

(Continued)

H. TRACOR 560 GAS CHROMATOGRAPH:

The maintenance schedule is outlined in the Appendices to this QAP.

The following spare materials should be kept on hand:

1. printer/plotter paper

2. carrier gas (special order)

3. supply gases (special order)

4. septums

I. DOHRMANN DC-80 CARBON ANALYZER:

The maintenance schedule for this instrument is outlined in th Appendices to this QAP.

The following spare materials should be kept on hand:

1. replacement setums - Part No. 517-811

2. pump tubes - Part Nos. 899-641, -645, -651

3. thermal printer paper - Part No. 040-646

4. tin metal - Part No. 511 - 876

J. GCA PRECISION SCIENTIFIC 44.5 C FECAL COLIFORM INCUBATOR:

The water bath is to be drained weekly and cleaned. Avoid splashing water into the control panel area.

An instrument control panel should be kept on hand, as well as a backup 44.5 C incubator.

PREVENTIVE MAINTENANCE

(Continued)

K. HP5890A GAS CHROMATOGRAPH

The maintenance schedule is outlined in the Appendices to this QAP.

L. HP 5970B MASS SELECTIVE DETECTOR

The maintenance schedule in outlined in the Appendices to this QAP.

The following spare materials should be kept on hand:

Description	HP Part No.	Qty.
Insulator, Vespel	05990-20136	2
Screw, 0-80 x 1/8	05990-20251	4
Screw, 0-80 x 1/4	05990-20250	4
Filament, Welded	05990-60084	4
Lockwasher, 0-80	2190-0049	3
Screw, 0-80 x 3/8	05990-20235	2
Repeller	05970-20042	1
Ion Source Chamber	05995-20084	1
Drawout Sleeve	05990-20216	1
Truarc Clip, Large	0510-0647	4
Spacer, Ceramic, Large	05990-20218	2
Spacer, Ceramic, Small	05990-20217	4
Curved Spring Washer	3050-0972	2
Truarc Clip, Small	0510-0238	4
Lens Contact Spring	05990-00186	1
Washer, Plain, 0-80	3050-0827	4
Spring, Repeller Contact	05995-20082	1
Electron Multiplier	1970-0075	1
Blank ferrule	0100-0691	2
Column ferrule for SGE nut	0100-1295	5
VCR nickel gasket	0100-1145	1
PFTBA vial O-ring	0100-0787	2
Column nut (SGE fitting)	05988-20066	1
PFTBA	8500-0656	1
"Blue" septa	9301-0370	10
Mechanical rough pump oil	6040-0517	1 qt
Turbomolecular pump oil	6040-0468	1/4 liter

SPECIFIC PROCEDURES TO BE USED TO ROUTINELY ASSESS DATA PRECISION, ACCURACY, AND COMPLETENESS

The precision and accuracy of laboratory data will be inspected immediately after the analyse are performed. Data from duplicate and spiked samples will be recorded and plotted on qualit control charts or entered into and compared with quality control tables to assure that the results are within the acceptance limits.

The precision and accuracy charts are designed to hold 20 sets of replicate determinations plu room for notes and comment.

PRECISION: The control limits for precision will be determined from past sets of replicate data. Data judged to be out of control (from comparison with literture reports and/or Supervisor's experience) will be discarded before calculations are made. (See also Section 1! following.) A series of control limits will be determined for different concentration ranges hen necessary. In general, however, our philosophy is that the precision of a series of eterminations can be represented by a statistic expressed as a percentage of the mean of replicate determinations, plus another statistic approximating the Minimum Detectable Concentration of that analyte. The first applies at determinant levels exceeding 10 times th MDC, the second at determinant levels near the MDC, and a combination at intermediate levels.

The control limits will be based on the Coefficient of Variation (Standard Deviation as % of Replicate Mean) og replicate determinations for a given concentration range. The upper control limit will be set at the 95-percent level for an in-control series of twenty determinations. Comparisons with Shewbart Control Charts as shown in EPA Publication No. 600/4-79-019 and in related material will be made to ensure comparibility of data with State Laboratories, and to ensure that our data is a least as precision controlled.

The upper control limit will be rounded to the appropriate units for each concentration range.

When replicate values are in different concentration ranges, the mean of values will determine the appropriate concentration range.

The analysis will be controlled when the CV for replicates is less than or equal to the upper control limit. When th CV (or S.D. at intermediate and lower concentration ranges) exceeds th upper control limit, the anlaysis must be stopped until the problem is identified and resolved After resolution, the problem and its solution must be documented and all analyses since the last in-control check must be repeated or invalidated.

SPECIFIC PROCEDURES TO BE USED TO ROUTINELY ASSESS
DATA PRECISION, ACCURACY, AND COMPLETENESS

(Continued)

ACCURACY: The control limits for accuracy will be developed from spiked sample data and will I based on the percent recovery of the spike.

The percent recovery, P, is defined as:

P = (100 X (Final Concentraion - Initial Concentration)/ Spike)

e initial concentration is the mean of replicate values.

e average percent recovery for each parameter is calculated from a series of 20 spiked replicates in the range of interest; a series which has been judged to be in control.

The standard deviation S, for percent recovery is calculated.

The control limits are average P +- 2 S, for 95 % confidence limits. The preparation set shoul be checked to see whether any values exceed the calculated control limits. Statiscally, one ou of twenty may be expected to exceed these limits. However, only one of 100 would be expected t exceed P +- 3 S. To check for proper distribution, at least 50 % of the data should fall withi the interval P +- S.

The analysis will be considered to be out-of-control if either of the following two conditions applies.

a. Any point beyond the control limits.

b. Seven successive points on the same side of the central line representing Average P.

STANDARD PROCEDURE FOR SELECTING REPLICATES

A. All determinations made in accordance with STANDARD METHODS (15th. Edition) or equivalent will subject to these selection rules.

B. 20 % additional effort above our normal workload will be devoted to replication and recov quality assurance work.

C. This means on the average - 5 % straight replication and 5 % replication with (10 % replication) recovery.

D. EVERY OTHER replication selected as specified below, therefore, will also be a RECOVERY D That it, we will determine replicates as usual, and also replicates on that same randomly-selected sample spiked per instructions with standard determinant.

USE OF THE SR-51 FOR RANDOM SELECTION:

This is dependent on the number, N, of samples on which given determination is to be made. (In some cases, we may have to make random selection in advance, in order to ask our client to provide sufficient sample to carry out usual procedure with as many as four aliquots.) This selection is to be made on EVERY SET we undertake henceforth, whether N comprises 1 or 1

If N is 10 or more, proceed to STEP TWO, IF N is more than 10, then come back to STEP ONE until all series of 10 or less are satisfied.

STEP ONE: Clear all on the SR-51. Then 2ND, RAN. (This decides if you are to DO a replicate on THIS SET of SUBSET of less than 10 samples. The answer is YES for N shown and RAN equal to or greater than shown paired with N below.)

1=> 90 2=> 80 3=> 70 4=> 60 5=> 50 6=> 40 7=> 30 8=> 20 9=> 10

STEP TWO. Clear all on the SR-51. Then 2ND RAN. (MULTIPLY BY) X. ON =, ROUND UP to next whole no. This selects the iTH sample in the set of N for replication. RECORD the identity and date set NOW on our QA sheet for that Determination and Range because EVERY OTHER replicate is to be a RECOVERY REPLICATE which will be recorded on a SEPARATE sheet AS WELL. Our QA SHEETS ARE to carried only for M sets of 20 replicates. We will complete 40 REPLCATE sets (two completed QA sheets) in the course of completing 20 RECOVERY sets. (One sheet.)

STANDARD PROCEDURE FOR SELECTING REPLICATES

(Continued)

ILLUSTRATION: Assume a set of ten samples is logged at the lab. The random generator, on activation of the sequence as described in our protocol, shows 70. Therefore sample No. 7 is replicated in this set.

We have

1 2 3 4 5 6 7 8 9 10

The next set of 10 is the other set. Suppose the random number generator, acuated, shows 30 Therefore the third sample in this sequence is replicated, and SPIKE replicated.

We have

11 12 13 14 15 16 17 18 19 20.

Out of a total of 20 we have done 4 additional determinations, which is 20 % additional.

QUALITY ASSURANCE REPORTS TO PROJECT MANAGEMENT

A daily quality assurance summary is submitted to routine NPDES clients on their routine reports.

A monthly quality assurance report will be prepared by the 5th. of the following month, to be submitted to SR management, with copies to Project Officers where required. The report is to include all parameters for quality control such as percent samples duplicated, percent samples spiked, samples voided, parameters voided, scheduled samples not collected, exceptions to holding times, and narrative of such actions taken.

A summary quality assurance report will be prepared within ninety days following last field sample in each completed field survey (two phases). Precision, accuracy, and completeness of [illegible] will be reported and evaluated on each measurement complement, together with a discussion of any significant QA problems, and submitted to: Arkansas Department of Pollution Control & Ecology, Attention - Mr. Larry Wilson; EPA Region VI, Attention - Ms. Bonnie S. Romo; Sorrells Research management; and Project Engineers, WLE Consultants.

CORRECTIVE ACTION

Initial set up for control charts and standard deviation of replication and average percentage recovery are reviwed to document that laboratory and field procedures are in control for each given determination and range.

Whenever the internal control check or performance audit indicates and out-of-control situation, corrective adtions must be taken.

Corrective actions is to be taken at each step of the laboratory process whenever problems appear. Each such problem is to be resolved before moving on to the next step of the procedure.

An analsis will be considered out-of-control the established control limits are exceeded. The analyst is responsible for detecting out-of-control situations and initiating the corrective action.

In general, laboratory problems may just require that the analyses be repeated, but field problems will usually, require new samples.

When an out-of-control situation occurs, the analysis must be stopped until the problem has been resolved. The corrective action must be approved by the Laboratory Supervisor, and documented. All analyses since the last in-control point must be repeated or the data invalidated.

Resolve any problems found in analyzing blank and midrange standard. Control contamination, re-calibrate, or review analyst's technique.

If recovery from field spike is unsatisfactory per control limits for analyte, analyst will prepare similarly-spike distilled water sample and analyze. Systematic error in the laboratory or fundamental problems with the spike, if revealed, are to be corrected.

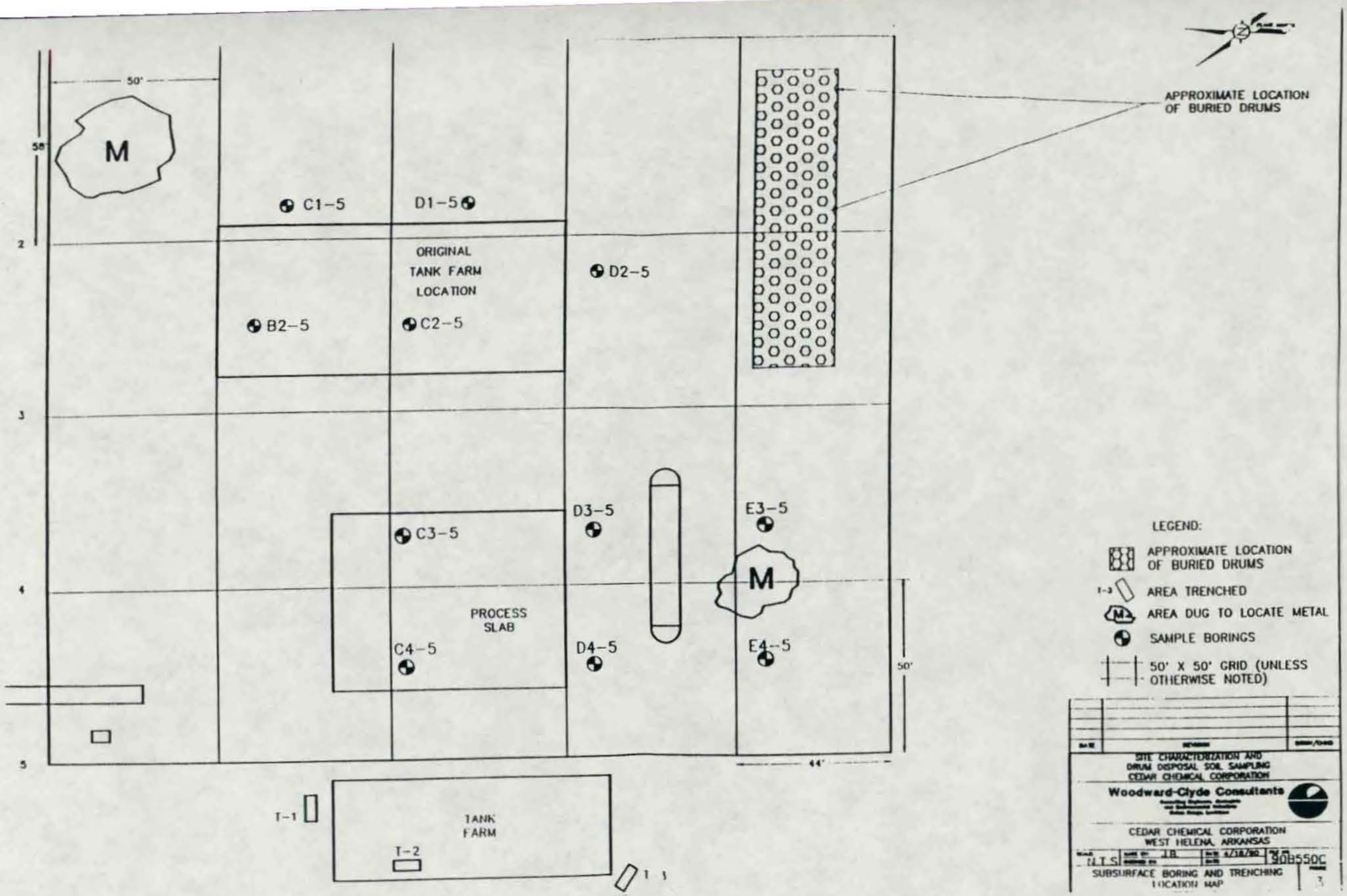
If recovery from field-spike environmental sample is unsatisfactory, similarly spike an aliquot of its replicate. Determine if there may be immediate sample interference or bad background.

Otherwise, determine if there must be special conditions not present in the laboratory, having a noticeable detriment to recovery of spike from environmental sample.

If replicates of same field sample exceed precision control limits, determine cause, and repeat laboratory analysis on entire set.

Finally, if all laboratory elements are determined to be in control, if simultaneously collected replicate field samples exceed limits, representativeness of field sampling technique will be addressed and corrected.

WOODWARD-CLYDE CONSULTANTS, INC.
INVESTIGATION OF BURIED DRUMS



50'
50'
M
C1-5
D1-5
ORIGINAL
TANK FARM
LOCATION
D2-5
B2-5
C2-5
APPROXIMATE LOCATION
OF BURIED DRUMS
2
3
4
5
D3-5
E3-5
C3-5
M
PROCESS
SLAB
C4-5
D4-5
E4-5
50'
44'
T-1
TANK
FARM
T-2
T-3
LEGEND:
APPROXIMATE LOCATION
OF BURIED DRUMS
AREA TRENCHED
AREA DUG TO LOCATE METAL
SAMPLE BORINGS
50' X 50' GRID (UNLESS
OTHERWISE NOTED)
SITE CHARACTERIZATION AND
DRUM DISPOSAL SOIL SAMPLING
CEDAR CHEMICAL CORPORATION
Woodward-Clyde Consultants
CEDAR CHEMICAL CORPORATION
WEST HELENA, ARKANSAS
N.T.S
JB
4/18/90
90B550C
SUBSURFACE BORING AND TRENCHING
LOCATION MAP
3

TABLE 1

CONCENTRATIONS OF CONTAMINANTS IN SOIL

(ALL VALUES AS mg/kg)

Boring (All Are Offset)	DCA	DNBP	ODCB	Propanil
B2.5				
0-5'	12.2	4,534	—	8.7
5-10'	2.3	39	—	9.0
10-15'	NIL	3	—	2.0
C1-5				
0-5'	152	36,087	—	712
5-10'	10.2	18,488	—	169
10-15'	0.2	84	—	0.1
C2.5				
0-5'	0.6	26	—	0.3
5-10'	0.1	7	—	0.5
10-15'	1.3	3	—	0.1
C3.5				
0-5'	11.6	72	NIL	25.5
5-10'	1.9	20	NIL	—
10-15'	0.2	ND	NIL	ND
C4.5				
0-5'	0.5	ND	NIL	ND
5-10'	0.5	0.2	NIL	NIL
10-15'	1.1	3	NIL	0.3
D1.5				
0-5'	1.9	158	—	1.1
5-10'	0.2	6	—	0.6
10-15'	NIL	2	—	0.4
D2.5				
0-5'	0.6	41	—	1.0
5-10'	0.1	2	—	0.6
10-15'	NIL	1	—	NIL

TABLE 1 (CONTINUED)

CONCENTRATIONS OF CONTAMINANTS IN SOIL

(ALL VALUES AS mg/kg)

Boring (All Are Offset)	DCA	DNBP	ODCB	Propanil
D3.5				
0-5'	8.8	85	NIL	17.4
5-10'	0.2	37	NIL	1.1
10-15'	0.9	0.3	NIL	5.6
D4.5				
0-5'	ND	0.2	NIL	0.1
5-10'	0.7	44	NIL	0.1
10-15'	0.5	0.4	NIL	0.1
E3.5				
0-5'	0.2	75	NIL	2.0
5-10'	0.1	2	NIL	3.9
10-15'	0.2	0.7	NIL	0.2
E4.5				
0-5'	0.7	0.2	NIL	0.7
5-10'	0.3	6	NIL	0.2
10-15	0.2	1	NIL	0.0

Note:

Analyses performed in Cedar Laboratory.

TABLE 2

CONCENTRATIONS OF CONTAMINANTS IN SOIL

(ALL VALUES AS mg/kg)

Boring	2,3 DCA	3,4 DCA	DNBP	ODCB	Propanil	2,3 DCNB	3,4 DCNB	Phenol	Anisole	Methoxychlor
B2.5 0-5'	ND	ND	4048	ND	4.128	ND	0.544	ND	ND	9.76
C1.5 0-5'	46.24	56.16	18720	12.4	276	ND	ND	ND	ND	ND
C2.5 0-5'	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
C3.5 0-5'	2.442	0.346	53.12	0.822	76.8	ND	ND	ND	ND	ND
C4.5 10-15'	ND	ND	1.744	ND	0.244	ND	ND	ND	ND	ND
D1.5 0-5'	0.010	ND	116.16	ND	ND	ND	ND	ND	ND	ND
D2.5 0-5'	ND	ND	29.056	ND	0.947	ND	ND	ND	ND	ND
D3.5 0-5'	0.614	2.726	49.92	0.069	26.464	0.0147	0.0128	ND	ND	0.195
D4.5 5-10'	ND	ND	33.28	ND	134.72	ND	ND	ND	ND	ND
E3.5 0-5'	ND	ND	42.56	ND	1.142	ND	ND	ND	ND	ND
E4.5 0-5'	ND	ND	ND	ND	1.053	ND	ND	ND	ND	ND
T1	1.123	1.651	25.856	0.15	0.056	29.568	444.8	ND	ND	93.76

ECOLOGY AND ENVIRONMENT, INC.
NATIONAL DIOXIN STUDY

ECOLOGY AND ENVIRONMENT, INC.

MEMORANDUM

Reviewed by 6AW-SC
date

TO: Keith Bradley, RPO

FROM: Tom Smith, FIT Geologist TWS

THRU: K.H. Malone, Jr., RPM KHM

DATE: February 12, 1985

SUBJ: Dioxin Sampling, Vertac Chemical, West Helena, Arkansas (AR361)
TDD #R-6-8411-15

On December 4, 1984, the FIT collected 43 samples from 43 locations at the Vertac Chemical site, West Helena, Arkansas, for dioxin analysis. The endeavor was part of the National Dioxin Study and represented a Tier 6 inspection.

A combined random/direct sampling approach was applied during this inspection. The direct approach was utilized along the northwestern boundary to quantify any dioxin residues which may have remained atop the inactive, covered surface impoundments (see attached map). A random approach was used throughout the remainder of the unpaved portions of the site.

A grid network was devised for the Vertac Site (see attached grid map). Grids 1-18, which are within the inactive surface impoundment area, were sampled by the direct method. Grids 19-159 were sampled by a random selection scheme as derived from a pocket calculator. Each sample was collected from the mid-point of the selected grid and followed the protocols described on pages 38-40 of the Final Draft Report: Sampling Guidance Manual For The National Dioxin Study, July 1984. The direct approach yielded 17 samples from 18 grids (grid 13 was inadvertently not sampled) and the random method yielded 26 samples from 141 grids (see attached sample location map).

Analytical data generated by this inspection indicated that no TCDD was present in any of the samples collected at the Vertac West Helena facility.

The FIT recommends that no further National Dioxin Study activity be conducted at this site.

APPENDIX E
GROUNDWATER DATA

Piezometer Elevations (Relative to Mean Seal Level)

ate	MSL_1	MSL_2	MSL-2A	MSL-3	MSL_3A	MSL-4	MSL-5	MSL-6	MSL-6A	MSL_7
06/22/88	166.10	166.40	179.22	166.30	195.20	166.00	166.60	165.80	194.10	166.2
08/09/88	166.08	166.05	179.22	165.87	195.20	166.22	165.72	165.35	194.10	165.6
08/15/88	164.83	165.05	179.22	164.70	176.45	164.72	164.55	163.85	181.02	164.4
08/24/88	165.08	165.38	179.22	165.03	176.45	164.13	164.97	164.52	180.52	164.7
08/30/88	164.83	164.88	179.22	164.95	176.45	164.97	165.22	164.60	180.27	164.9
09/19/88	167.42	167.63	179.22	167.45	176.45	167.30	167.38	166.93	179.60	167.2
10/07/88	167.33	167.55	179.22	167.53	176.45	167.55	167.42	167.02	178.93	167.2
10/13/88	167.58	167.63	179.22	167.62	195.20	167.72	167.47	167.18	178.85	167.3
10/21/88	167.67	167.80	179.22	167.78	176.62	167.80	167.67	167.27	178.77	167.4
10/28/88	167.83	167.97	179.22	167.95	176.62	167.97	167.76	167.27	179.18	167.6
11/04/88	168.08	168.14	179.22	168.20	176.62	168.22	168.01	167.68	178.85	167.9
11/11/88	167.92	168.05	179.22	168.04	176.62	168.05	167.84	167.52	178.60	167.7
11/18/88	168.08	168.55	179.22	168.45	176.62	168.47	168.26	167.93	178.93	168.1
11/29/88	170.33	170.55	179.22	170.28	176.62	170.38	170.01	168.77	181.52	169.9
12/16/88	170.33	170.38	179.22	170.28	176.62	170.38	170.09	169.85	181.18	169.9
01/06/89	172.25	172.30	179.22	172.28	176.62	172.47	172.01	171.77	183.43	167.9
01/20/89	173.83	173.97	179.30	173.87	176.62	174.13	173.67	173.35	186.18	173.5
01/27/89	173.67	173.63	179.22	173.53	176.62	173.80	173.34	173.02	186.18	173.2
02/02/89	173.92	174.05	179.22	174.03	176.62	174.22	173.76	173.52	186.68	173.7
02/10/89	173.83	173.97	179.22	173.95	176.62	174.13	173.76	173.43	187.35	173.57
02/24/89	175.75	175.88	179.22	175.87	176.62	175.97	175.59	175.27	187.85	175.57
03/03/89	176.08	176.22	179.22	176.20	176.62	176.30	176.01	175.68	188.43	175.90
03/10/89	176.00	176.13	179.22	176.12	176.62	176.30	176.01	175.60	188.27	175.82
3/31/89	176.00	176.13	179.22	176.12	176.62	176.47	176.01	175.60	187.60	175.90
3/31/89	175.92	176.05	179.22	176.12	176.62	176.30	175.92	175.60	187.68	175.82
04/14/89	175.25	175.47	179.22	175.45	176.62	175.63	175.34	174.93	186.93	175.23
04/21/89	174.67	175.13	179.22	174.70	176.62	175.13	174.63	174.35	186.18	174.57
04/28/89	174.67	175.05	179.22	174.95	176.62	175.05	174.55	174.27	185.52	174.48
05/05/89	174.50	174.55	179.22	174.70	176.62	174.80	174.38	174.10	185.02	174.32
05/12/89	175.25	175.22	179.22	175.37	176.62	175.47	175.05	174.68	185.10	174.98
05/19/89	173.83	173.97	179.22	173.87	176.62	173.97	173.55	173.27	184.68	173.48
05/26/89	174.53	174.40	179.20	173.35	177.05	174.43	173.95	173.75	185.73	173.85
06/02/89	173.75	173.65	179.20	173.60	177.05	173.75	173.25	173.00	185.25	173.10
06/09/89	173.80	173.65	179.20	173.60	177.05	173.75	173.20	173.00	185.00	173.10
06/16/89	175.50	175.40	179.20	175.40	177.05	175.50	175.15	174.90	186.20	175.00
06/23/89	174.85	174.80	179.20	174.75	177.05	174.90	174.40	174.10	186.10	174.30
06/30/89	174.40	174.35	179.20	174.30	177.05	174.50	174.00	173.70	185.50	173.85
07/07/89	176.80	176.80	180.65	176.90	177.20	176.90	176.70	176.30	187.05	176.40
07/14/89	176.10	176.10	180.70	176.15	177.40	176.30	176.00	175.65	187.35	175.80
07/21/89	175.10	175.05	180.10	175.05	177.35	175.25	174.75	174.40	187.10	174.60
07/28/89	174.20	174.15	179.20	174.15	177.20	174.35	173.85	173.55	186.55	173.65
08/04/89	174.00	173.95	179.20	174.00	177.05	174.20	173.60	173.50	186.45	173.65
08/11/89	171.95	171.80	179.20	172.30	177.05	172.65	172.30	171.90	185.50	172.10
08/16/89	168.80	168.95	179.20	168.80	177.05	167.95	168.30	167.80	184.20	168.10
08/25/89	170.90	170.80	179.20	170.90	177.05	171.10	170.55	170.25	183.75	170.40
09/01/89	171.35	172.30	179.20	171.30	177.05	171.50	170.95	170.70	184.20	170.80
09/08/89	171.95	172.20	179.20	172.30	177.05	172.40	172.05	171.75	183.20	171.85
09/08/89	170.75	170.80	179.20	171.10	177.05	171.20	170.95	170.55	183.40	170.75
/22/89	172.25	172.20	179.20	172.30	177.05	171.40	172.05	171.80	182.90	171.90
/05/89	173.20	173.10	179.20	173.20	177.05	173.40	172.95	172.65	184.15	172.80
0/13/89	173.05	173.00	179.20	173.05	177.05	173.20	172.85	172.55	183.45	172.65
10/17/89	173.20	173.10	179.20	173.15	177.05	173.30	172.95	172.65	183.40	172.75

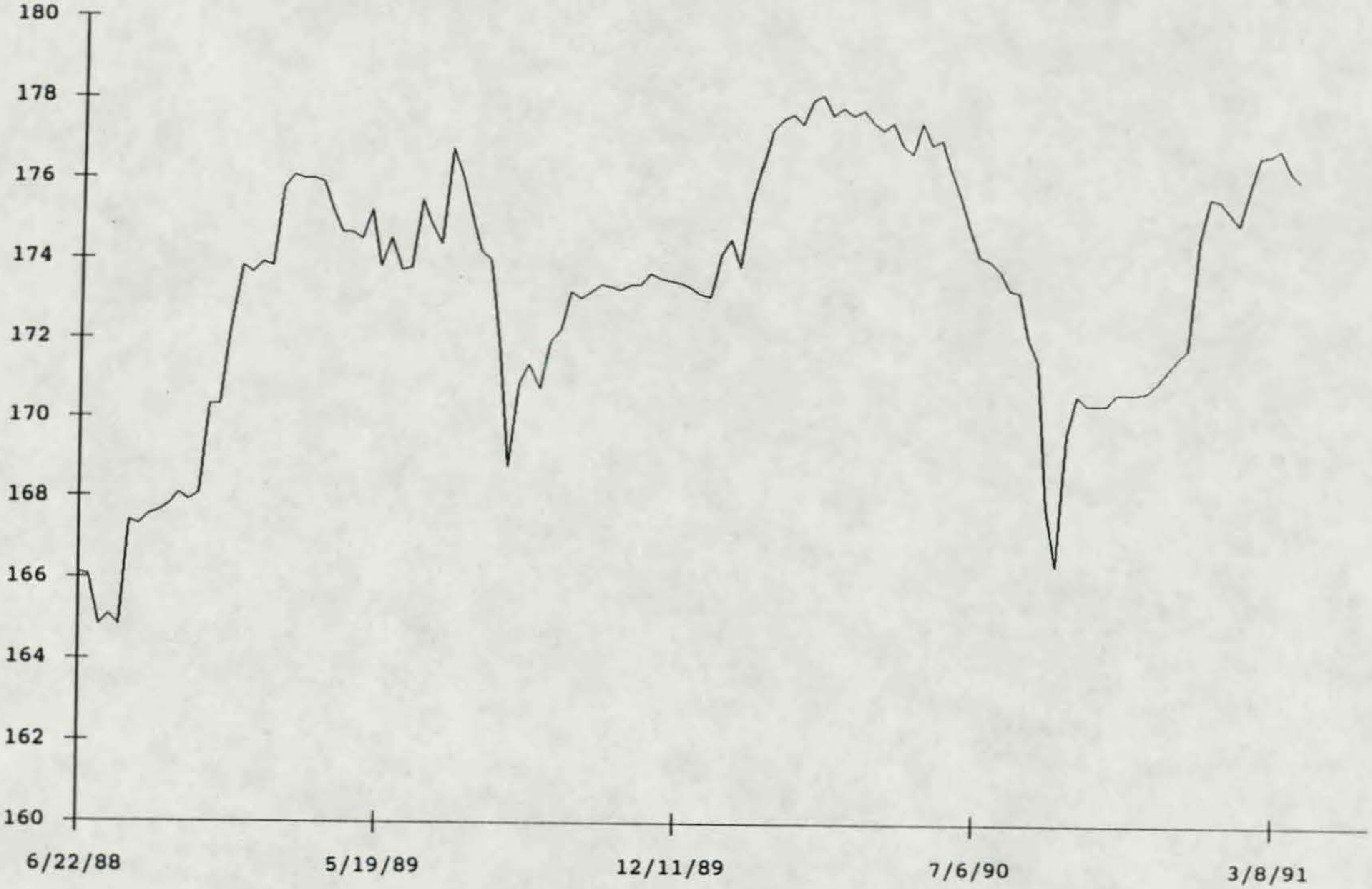
Piezometer Elevations (Relative to Mean Seal Level)

Date	MSL_1	MSL_2	MSL-2A	MSL-3	MSL_3A	MSL-4	MSL-5	MSL-6	MSL-6A	MSL_7
10/20/89	173.40	173.35	179.20	173.45	177.05	173.50	173.15	172.90	184.05	173.0
10/27/89	173.35	173.30	179.20	173.35	177.05	173.45	173.10	172.80	183.70	172.9
11/03/89	173.25	173.20	179.20	173.20	177.05	173.30	173.00	172.70	183.15	172.8
11/10/89	173.40	173.30	179.20	173.35	177.05	173.45	173.15	172.90	183.70	172.9
11/17/89	173.40	173.30	179.20	173.35	177.05	173.45	173.10	172.85	183.60	172.9
11/27/89	173.70	173.65	179.20	173.70	177.05	173.80	173.40	173.20	184.65	173.3
12/01/89	173.55	173.50	179.20	173.50	177.05	173.15	173.25	173.00	184.35	173.1
12/08/89	173.50	173.40	179.20	173.45	177.05	173.55	173.20	172.95	183.75	173.0
12/11/89	173.45	173.35	179.20	173.40	177.05	173.55	173.20	172.90	183.70	173.0
12/15/89	173.35	173.20	179.20	173.25	177.05	173.40	173.05	172.80	183.45	172.8
12/21/89	173.15	173.05	179.20	173.10	177.05	173.20	172.90	172.60	183.25	172.7
12/28/89	173.10	173.00	179.20	173.05	177.05	173.15	172.75	172.55	183.15	172.6
01/05/90	174.15	174.00	179.20	173.95	177.05	174.20	173.75	173.55	185.15	173.6
01/12/90	174.55	174.45	179.20	174.45	177.05	174.70	174.25	174.00	185.85	174.0
01/19/90	173.85	174.65	179.20	174.75	177.05	174.95	174.50	174.30	186.15	174.3
01/26/90	175.50	175.40	179.20	175.45	177.05	175.65	175.20	174.95	186.85	175.05
02/02/90	176.40	176.30	179.20	176.30	177.05	176.50	176.05	175.80	187.45	175.90
02/08/90	177.30	177.25	180.10	177.30	177.20	177.40	177.00	176.75	188.05	176.85
02/16/90	177.55	177.50	180.55	177.50	177.65	177.70	177.30	177.00	188.20	177.15
02/23/90	177.70	177.65	180.75	177.65	177.80	177.90	177.45	177.15	188.50	177.30
03/02/90	177.45	177.45	180.75	177.45	178.05	177.65	177.25	176.95	188.45	177.10
03/09/90	178.05	178.00	181.05	177.95	178.20	178.25	177.80	177.50	188.55	176.65
03/19/90	178.15	178.20	181.15	178.20	178.30	178.50	178.00	177.65	188.65	177.80
03/23/90	177.65	177.70	181.55	178.70	179.20	178.00	177.50	177.15	188.25	177.35
03/30/90	177.85	177.85	181.30	177.90	178.65	178.20	177.70	177.30	188.35	177.50
04/06/90	177.65	177.70	181.35	177.70	178.55	178.00	177.55	176.15	187.95	177.30
04/12/90	177.80	177.80	181.45	177.85	178.70	178.10	177.60	177.25	187.95	177.45
04/19/90	177.50	177.50	181.20	177.55	179.10	177.75	177.35	177.00	187.90	177.15
04/26/90	177.30	177.30	180.95	177.35	179.40	177.50	177.15	176.75	187.80	176.95
05/07/90	177.50	177.45	181.15	177.45	179.65	177.55	177.25	176.90	187.75	177.05
05/11/90	176.95	177.00	180.80	177.00	179.55	177.15	176.80	176.40	187.30	176.60
05/18/90	176.75	176.80	180.35	176.80	179.55	176.95	176.60	176.25	187.05	176.40
05/24/90	177.50	177.50	181.50	177.50	180.00	177.70	177.30	176.95	187.70	177.10
06/01/90	176.95	177.00	180.55	177.00	179.90	177.15	176.80	176.45	187.05	176.60
06/08/90	177.10	177.10	180.45	177.15	179.95	177.25	176.95	176.60	187.10	176.75
06/15/90	176.30	176.35	180.30	176.35	180.00	176.45	176.05	175.65	187.00	175.85
06/22/90	175.65	175.70	178.90	175.70	179.70	175.80	175.50	175.10	187.00	175.30
06/29/90	174.85	174.90	179.20	174.85	179.50	174.95	174.60	174.10	185.85	174.35
07/06/90	174.15	174.00	179.20	174.15	179.20	174.35	173.90	173.60	185.20	173.75
07/13/90	174.05	174.05	179.20	174.10	178.85	174.20	173.90	173.50	184.85	173.70
07/20/90	173.80	173.80	179.20	173.80	178.60	173.90	173.60	173.20	184.20	173.40
07/27/90	173.30	173.30	179.20	173.35	178.40	173.40	173.15	172.70	183.75	172.95
08/03/90	173.25	173.30	179.20	173.30	178.15	173.35	173.15	172.75	183.70	172.95
08/10/90	172.10	172.15	179.20	172.15	177.95	172.20	171.95	171.50	183.30	171.75
08/17/90	171.50	171.40	179.20	171.35	177.75	168.50	171.05	170.60	182.90	170.80
08/24/90	167.85	167.30	179.20	167.50	177.15	167.85	167.10	166.90	182.40	166.95
08/31/90	166.40	166.55	179.20	166.60	177.10	166.70	166.50	165.90	182.05	166.20
09/07/90	169.70	169.70	179.20	169.80	177.10	170.00	169.75	169.40	181.95	169.50
09/14/90	170.65	170.60	179.20	170.60	177.10	170.75	170.50	170.20	181.65	170.30
09/21/90	170.40	170.40	179.20	170.50	177.10	170.50	170.30	169.95	181.40	171.10
09/28/90	170.40	170.40	179.20	170.55	177.10	170.55	170.35	169.90	181.30	170.15
10/05/90	170.40	170.40	179.20	170.45	177.10	170.50	170.25	169.90	181.30	170.05

Piezometer Elevations (Relative to Mean Seal Level)

Date	MSL_1	MSL_2	MSL-2A	MSL-3	MSL_3A	MSL-4	MSL-5	MSL-6	MSL-6A	MSL_7
10/12/90	170.70	170.65	179.20	170.70	177.10	170.75	170.50	170.20	181.60	170.3
10/19/90	170.70	170.60	179.20	170.70	177.10	170.70	170.45	170.15	181.25	170.3
10/26/90	170.70	170.65	179.20	170.70	177.10	170.75	170.50	170.20	181.10	170.3
11/02/90	170.75	170.70	179.20	170.75	177.10	170.75	170.50	170.20	180.85	170.0
11/09/90	171.00	170.95	179.20	170.95	177.10	171.00	170.75	170.45	181.45	170.5
11/16/90	171.30	171.25	179.20	171.25	177.10	171.30	171.00	170.75	181.60	170.8
11/30/90	171.60	171.45	179.20	171.50	177.10	171.50	171.20	170.95	181.80	170.9
12/14/90	171.85	171.70	179.20	171.80	177.10	171.75	171.45	171.25	181.70	171.3
01/04/91	174.60	174.55	179.20	174.55	177.10	174.65	174.30	173.05	184.75	174.1
01/11/91	175.65	175.55	179.20	175.55	177.10	175.70	175.30	175.05	185.65	175.1
01/19/91	175.60	175.55	179.20	175.35	177.10	175.70	175.30	175.05	185.45	175.1
01/25/91	175.30	175.30	179.20	175.35	177.10	175.45	175.10	174.80	185.55	174.9
02/01/91	175.00	174.95	179.20	174.95	177.10	175.10	174.80	174.50	184.90	174.6
02/08/91	175.90	175.85	179.20	175.85	177.10	176.00	175.60	175.35	185.80	175.4
02/22/91	176.70	176.70	179.20	176.70	177.55	176.80	176.50	176.20	186.70	176.3
02/28/91	176.75	176.70	179.20	176.75	177.65	176.85	176.55	176.20	186.80	176.3
03/08/91	176.90	176.90	179.25	176.90	177.80	177.00	176.70	176.40	187.05	176.5
03/15/91	176.30	175.40	179.80	176.30	177.90	176.50	176.15	175.80	187.00	175.9
03/21/91	176.05	176.05	179.20	176.10	178.15	176.25	175.90	175.55	187.15	175.7
Average f	173.35	173.37	179.50	173.38	177.84	173.46	173.16	172.81	184.79	172.9

B-1



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3-2

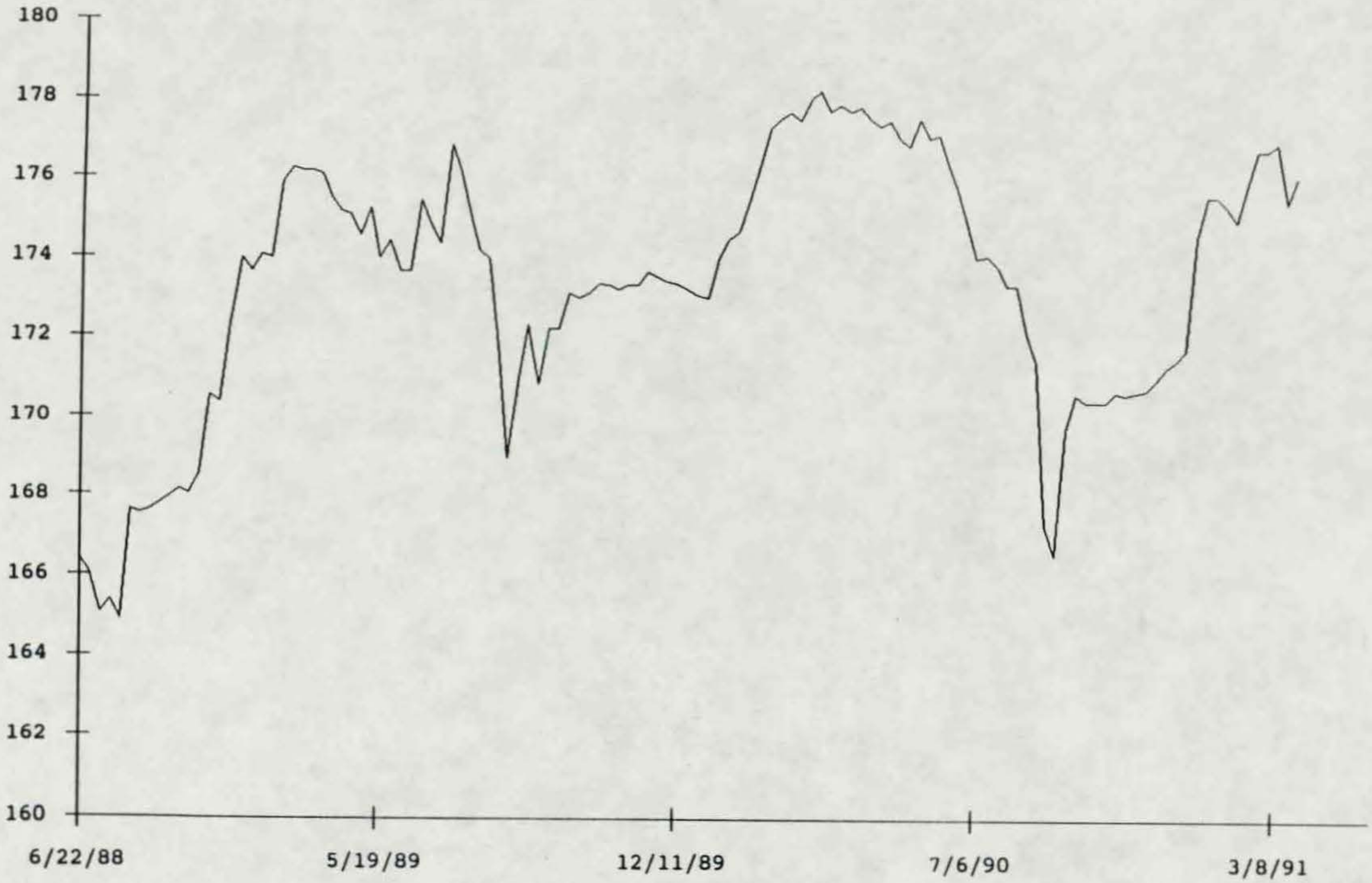
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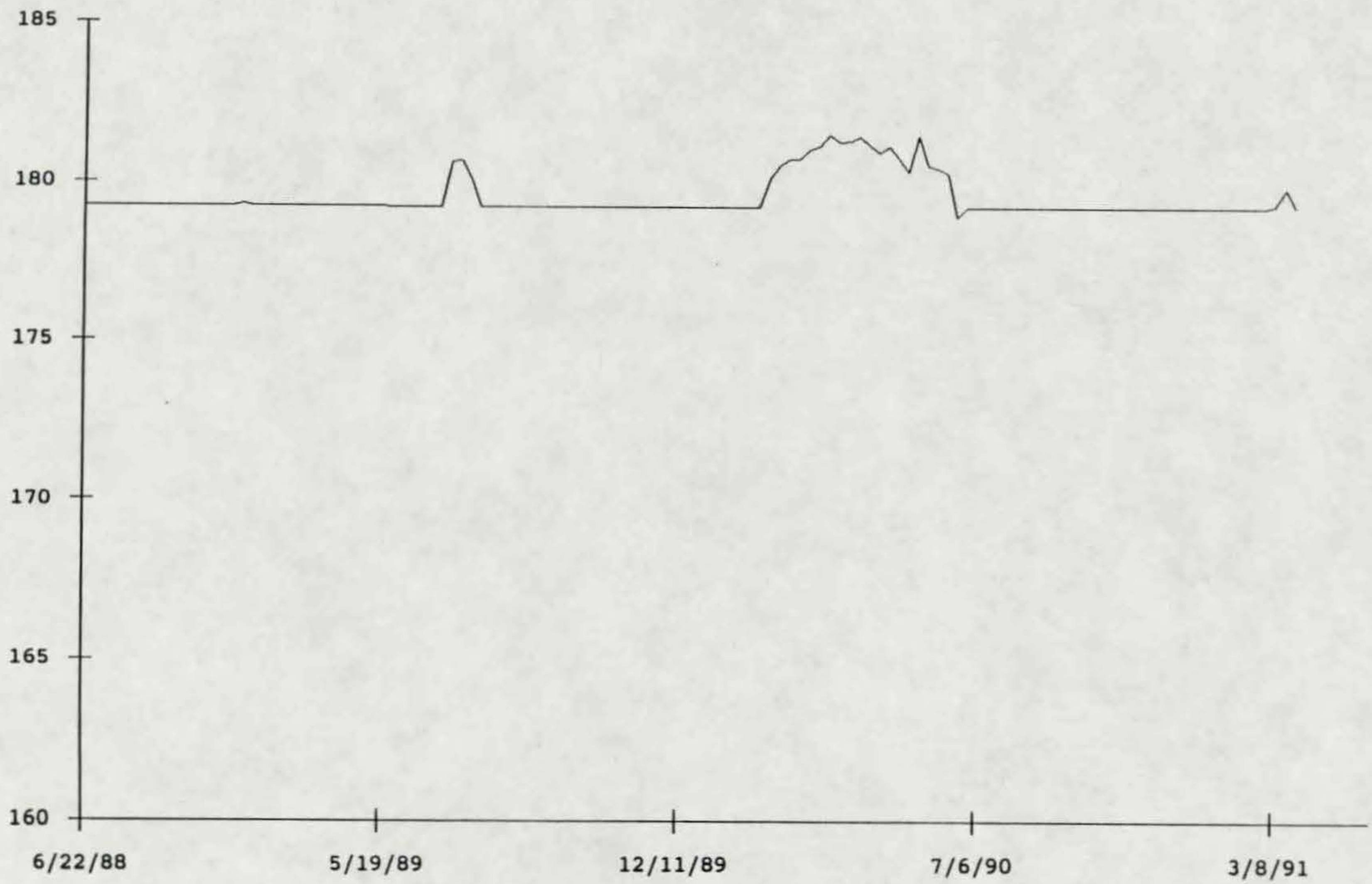
Chart9



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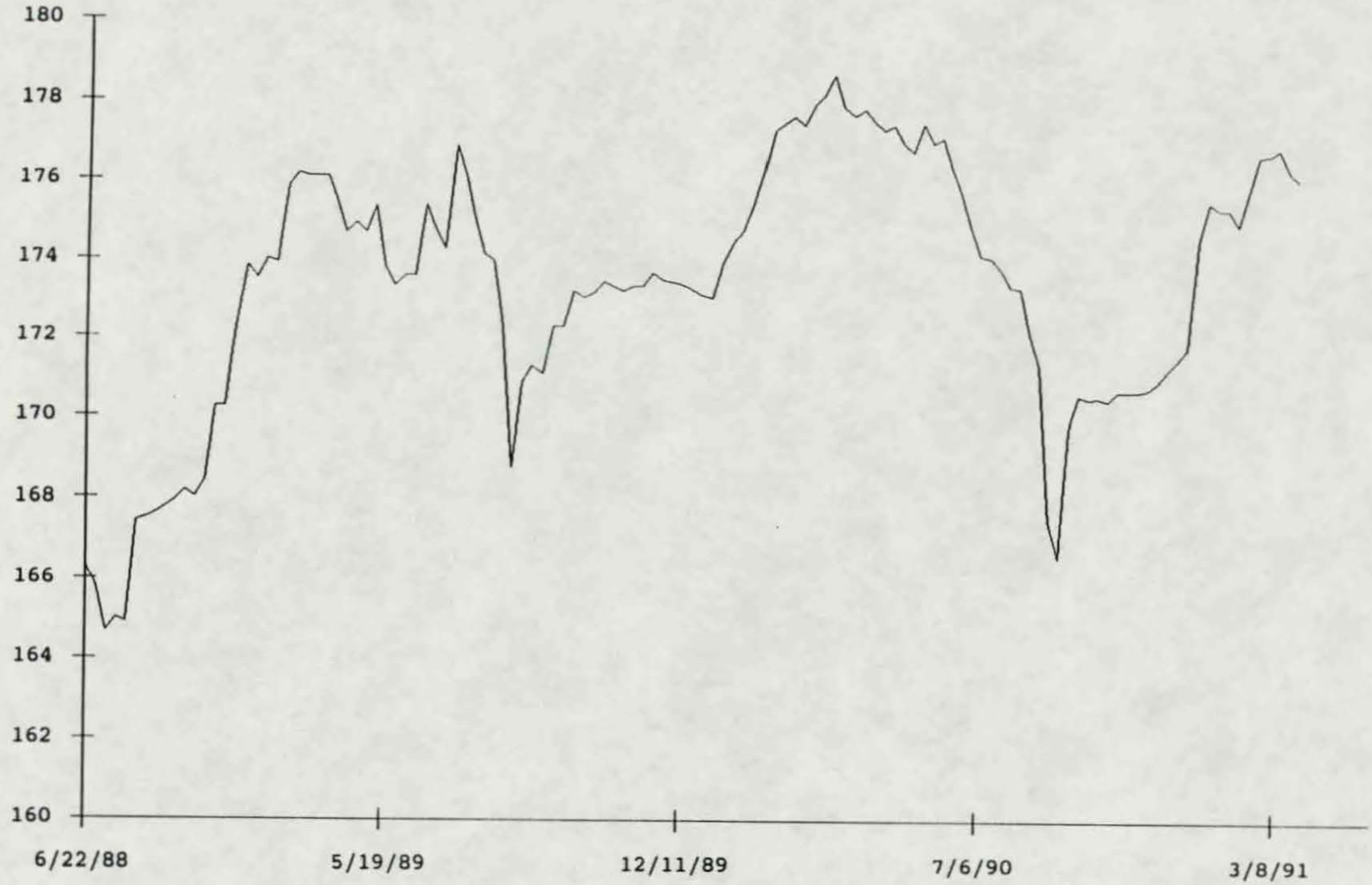
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Chart12

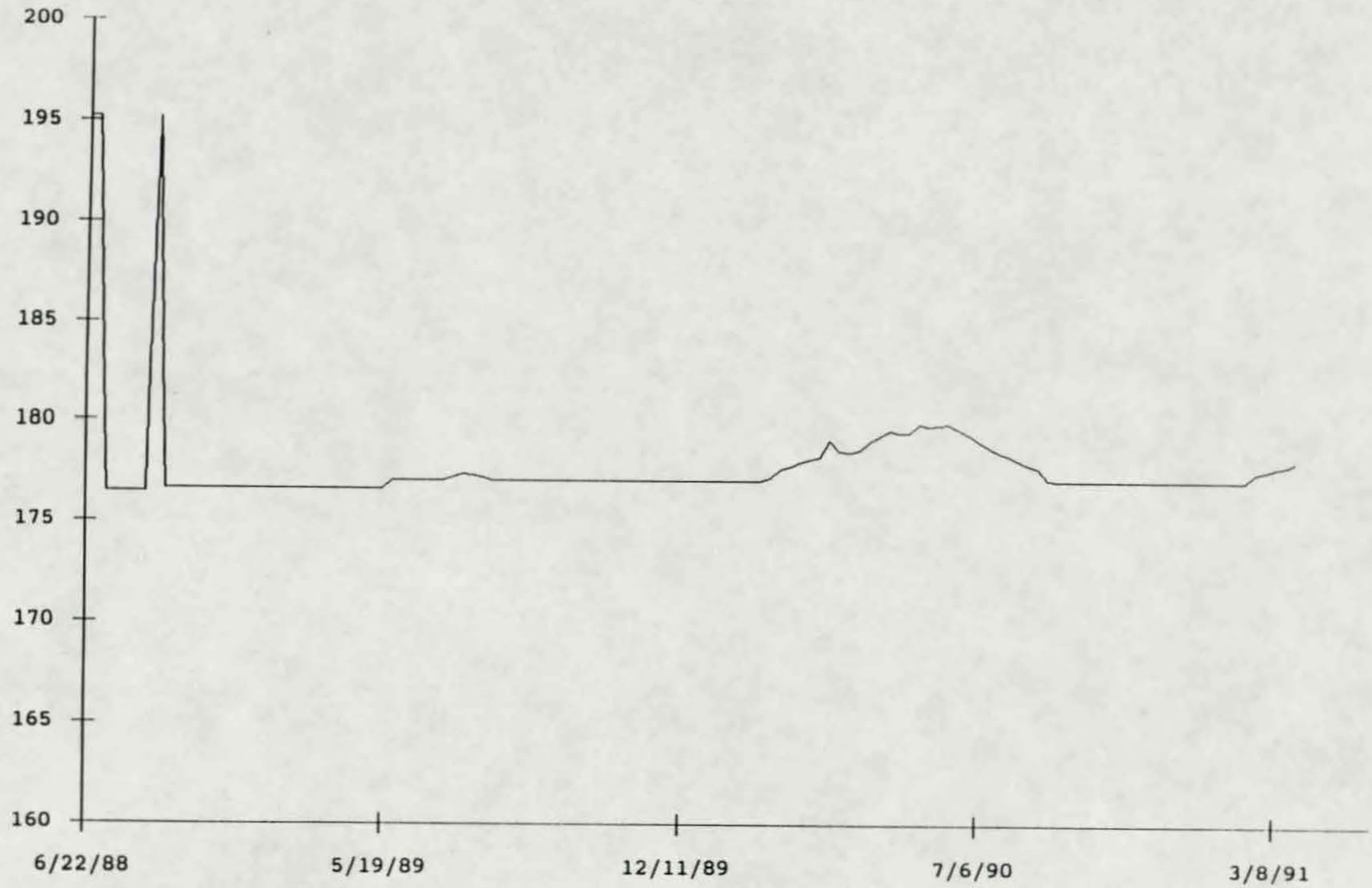

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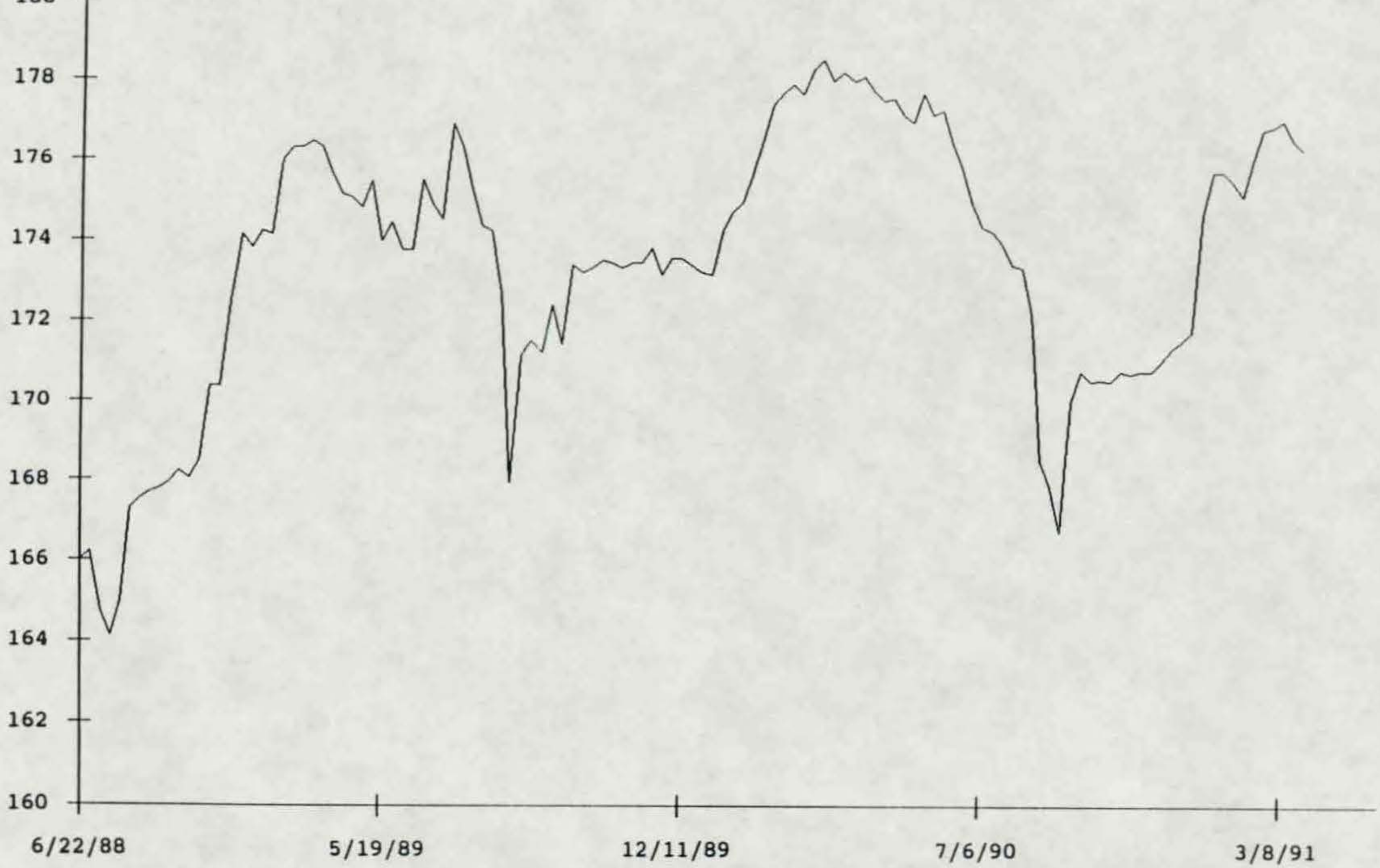
Chart13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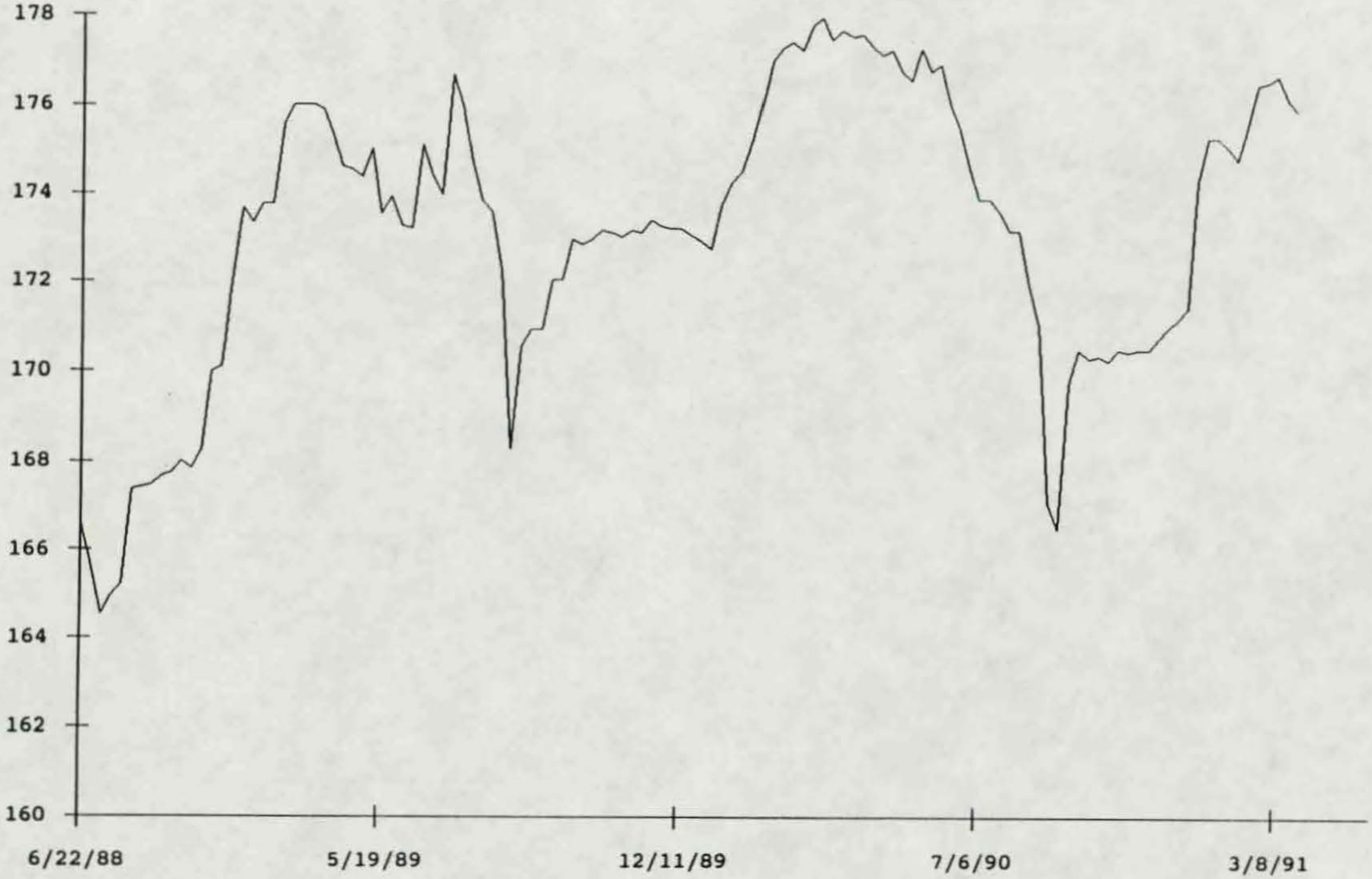
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Chart15

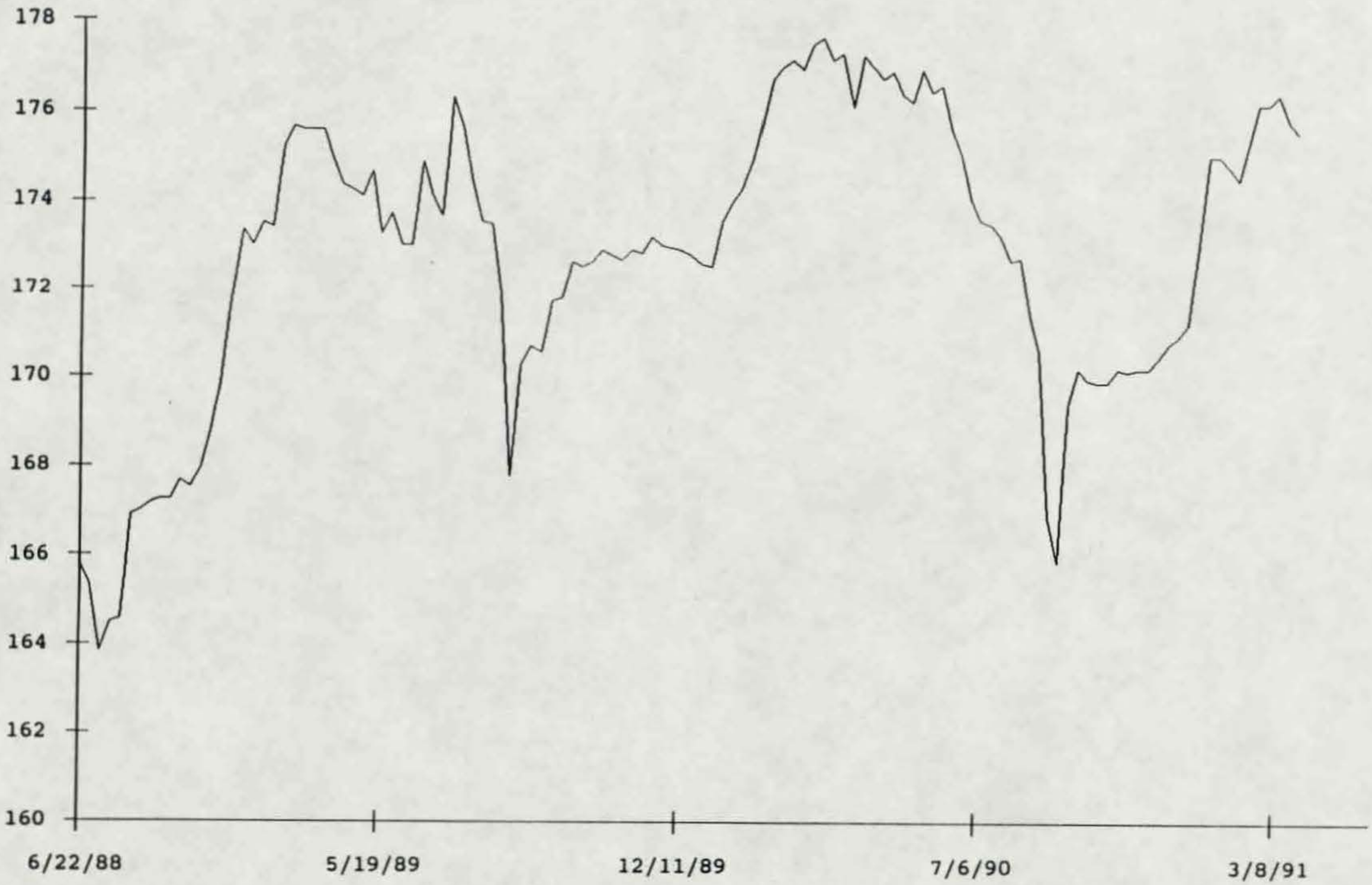
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Chart16

B-6A

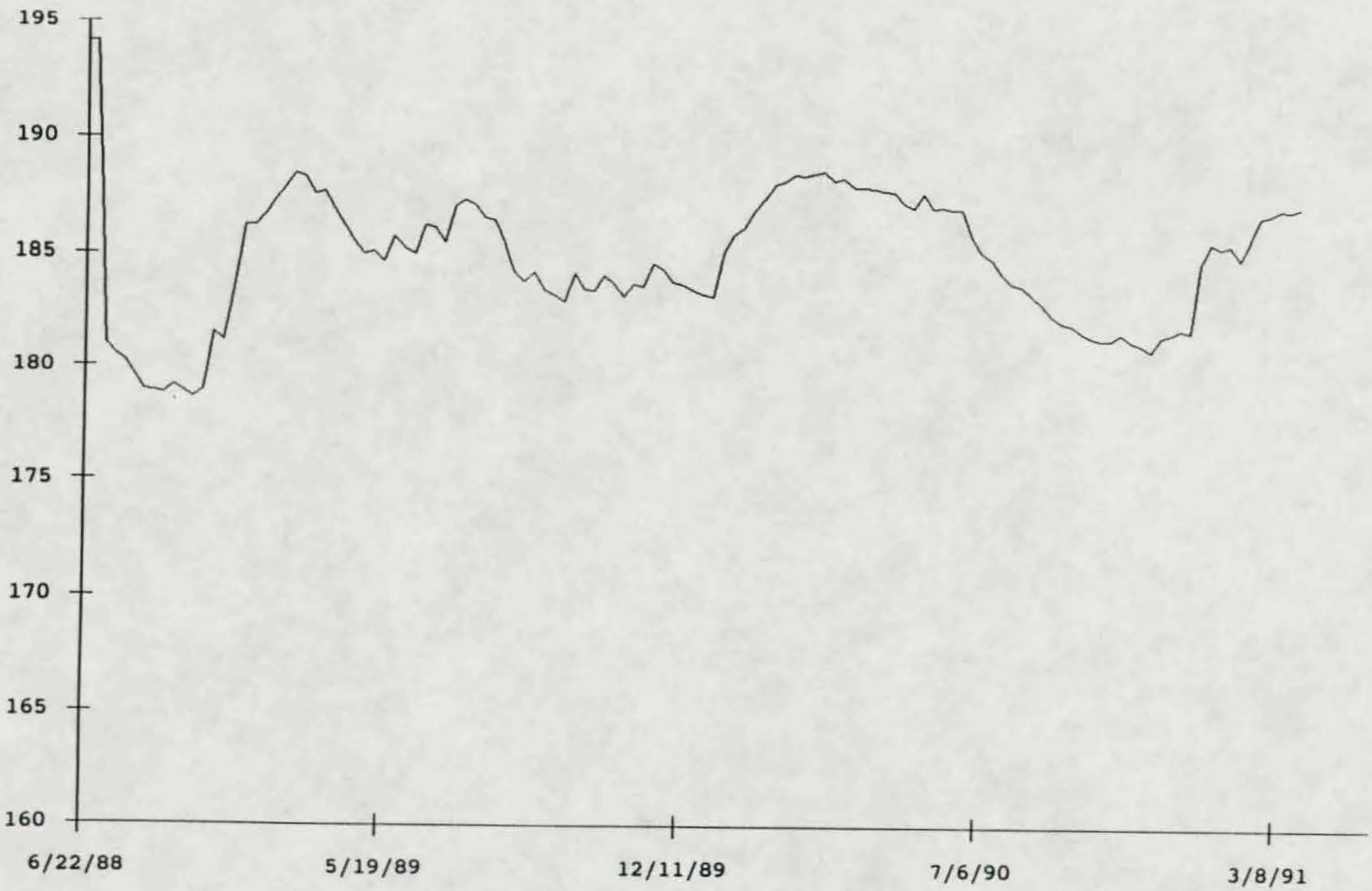
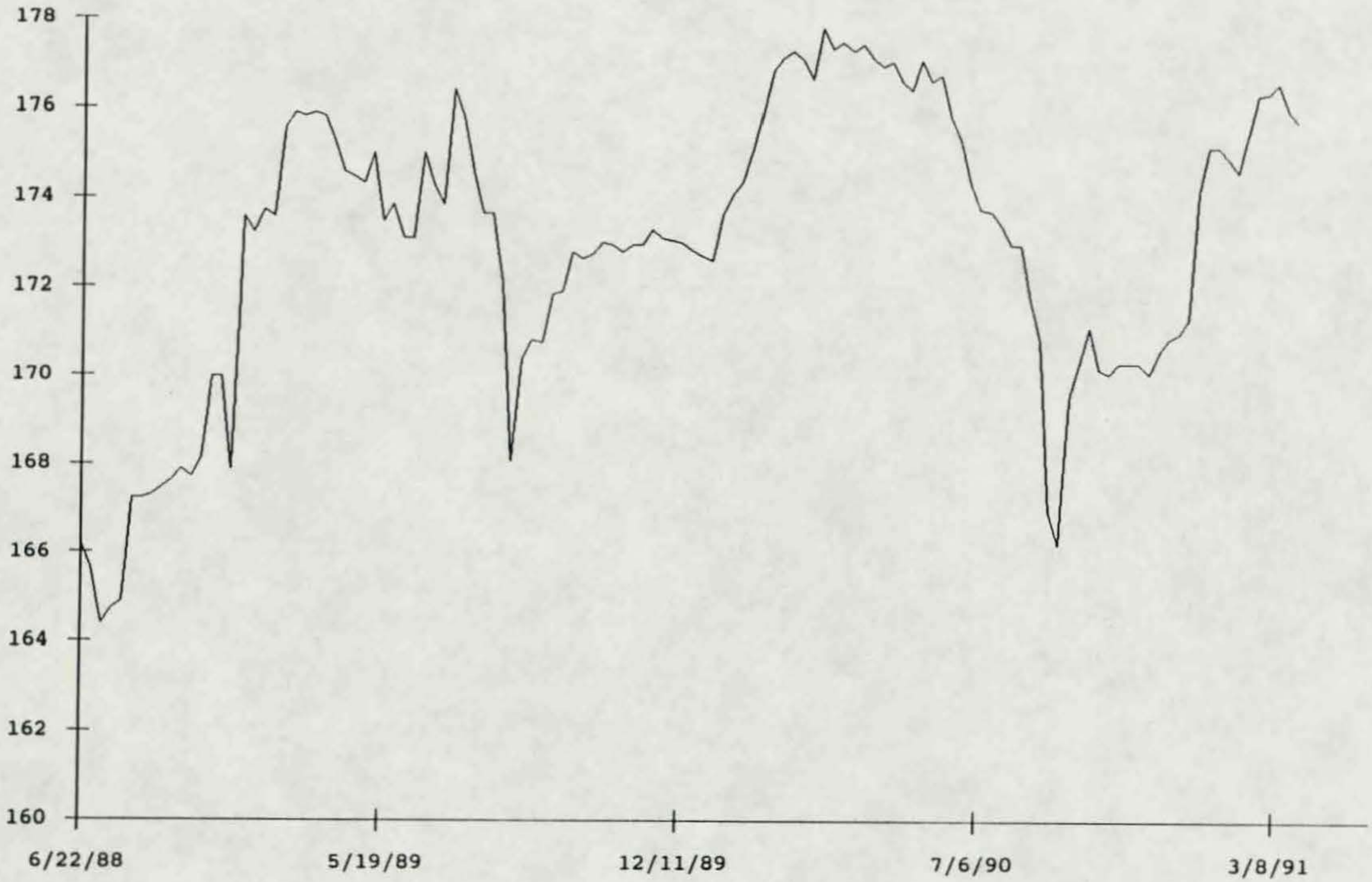


Chart17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3/8/91

Cedar Chemical Corporation - Monitoring Well Analysis Report :

Date	Well	pH	Spec_Cond	TOH	TOC	Comment
10/17/89	1	6.71	1850	0.783	4.59	
10/17/89	1			0.765	4.64	Field Duplicate
12/11/89	1	7.28	1900	0.657	4.96	
02/16/90	1	7.38	2000	0.648	5.72	
04/26/90	1	6.94	2000	0.988	4.76	
Average for 1		7.07	1937	0.768	4.93	
10/17/89	2	6.58	860	0.037	2.06	
12/11/89	2	7.42	900	0.065	1.74	
12/11/89	2			0.077	3.10	Field Duplicate
02/16/90	2	7.81	850	0.020	2.74	
04/26/90	2	7.18	800	0.167	1.93	
Average for 2		7.24	852	0.073	2.31	
10/17/89	3	6.39	4500	6.570	38.40	
12/11/89	3	6.66	3250	4.970	26.20	
02/16/90	3			3.360	24.44	Field Duplicate
02/16/90	3	6.70	3500	4.370	24.97	
04/26/90	3	6.43	4500	6.890	36.01	
Average for 3		6.54	3937	5.232	30.00	
10/17/89	4	6.82	2800	1.840	10.10	
12/11/89	4	7.42	2500	1.780	9.72	
02/16/90	4	7.49	2900	1.970	12.63	
04/26/90	4			2.153	12.51	Field Duplicate
04/26/90	4	7.32	2600	2.059	11.72	
Average for 4		7.26	2700	1.960	11.33	
10/17/89	6	7.56	1100	0.081	3.64	
12/11/89	6	7.77	1000	0.273	19.34	
02/16/90	6	8.00	1100	0.053	22.80	
04/26/90	6	7.69	1100	0.089	13.56	
Average for 6		7.75	1075	0.124	14.83	

Date	Well	pH	Spec_Cond	TOH	TOC	Comment
10/17/89	6A	7.76	700	0.201	2.31	
12/11/89	6A	7.52	700	0.035	2.37	
02/16/90	6A	7.71	760	0.062	2.81	
04/26/90	6A	7.46	775	0.072	2.94	
Average for 6A		7.61	733	0.092	2.60	
10/17/89	6B	7.33	3500	39.100	85.90	
12/11/89	6B	7.46	3100	31.500	84.70	
02/16/90	6B	7.37	3900	44.000	19.99	
04/26/90	6B	7.23	3000	33.900	71.82	
Average for 6B		7.34	3375	37.125	65.60	
10/17/89	6C	7.43	2100	50.800	78.70	
12/11/89	6C	7.54	2100	44.800	74.80	
02/16/90	6C	7.07	2100	12.200	101.80	
04/26/90	6C	7.04	2000	24.400	66.63	
Average for 6C		7.27	2075	33.050	80.48	
10/17/89	7	7.62	840	0.602	7.50	
12/11/89	7	7.83	850	0.979	8.77	
02/16/90	7	8.08	960	3.500	14.03	
04/26/90	7	7.65	1500	7.280	10.36	
Average for 7		7.79	1037	3.090	10.16	
10/17/89	F Blan			0.023	1.23	
12/11/89	F Blan			0.029	0.66	
02/16/90	F Blan			0.022	2.24	
04/26/90	F Blan			0.141	1.77	
Average for F Bl		0.00	0	0.053	1.47	

ARKANSAS DEPARTMENT OF POLLUTION CONTROL AND ECOLOGY

MEMORANDUM

TO : Mark Simpson, Geologist, R.S.T. Div. JJ

FROM : Jay Justice, Hazardous Waste Chemist, T.S. Div.

DATE : 7-DEC-1989

SUBJECT : Results from analysis on groundwater samples taken at Cedar Chemical Company on October, 17, 1989.

The groundwater samples taken October 17, 1989, at Cedar Chemical Company located at West Helena have been analyzed for Semivolatile Organics and Total Organic Carbon. The results from these analyses are listed below and are expressed in mg/l.

Well #3

TOC	41
Methoxybenzene (1)	0.02
Dichlorobenzene (1)	0.15
Propanil (1)	0.17

Well #6C

TOC	67
Dichloroanilines (1)	25
Chloroaniline (1)	0.1

Well #6A

TOC	1.5
Phenylaniline (1)	0.025

Field Duplicate
(Well #6C)

TOC	71
Dichloroanilines (1)	25

(1) Denotes a concentration that has been estimated.

: Jim Rigg, Geologist II, Groundwater Section
Hazardous Waste Division

ARKANSAS DEPARTMENT OF POLLUTION CONTROL AND ECOLOGY

MEMORANDUM

TO : David Hartley, Geologist II, Groundwater Sec.,H.W.

FROM : Jay Justice, Hazardous Waste Chemist, T.S. JJ

DATE : 10-APR-1990

SUBJECT : Results taken from analyses performed on samples taken from monitoring wells located at Cedar Chemical Company on February 16, 1990

The samples taken from monitoring wells located at Cedar Chemical Company on February 16, 1990, have been analyzed for TOC and semivolatile organics. The results from these analyses are listed below and are expressed in mg/l.

MW 1

TOC	5.8
1,2-Dichlorobenzene	0.04

MW 2

TOC	2.2
Semivolatile organics	<0.04

MW 3

TOC	21
1,2-Dichlorobenzene	0.28
Dichloroanilines (1)	0.13-0.25
Propanil (1)	0.04-0.09

MW 4

TOC	11
Bromacil (1) (2)	0.04-0.07

MW 6

TOC	18
Semivolatile organics	<0.04

NW 6A

TOC	2.1
Semivolatile organics	<0.04

MW 6B

TOC	77
1,2-Dichlorobenzene	0.06
Chloroanilines (1)	0.32-0.63
Dichloroanilines (1)	14-28
Bromacil (1) (2)	0.07-0.13

MW 6C

TOC	73
Chloroanilines (1)	0.16-0.31
Dichloroanilines (1)	13-25
Propanil (1)	0.15-0.3
Bromacil (1) (2)	0.04-0.09

MW 7

TOC	10
Substituted monochlorinated Benzotriazoles (1) (2)	0.08-0.17

Field Duplicate
(MW 6)

TOC	NA(3)
Semivolatile organics	<0.04

Spike
(Percent Recovery)

Phenol	54
2-Chlorophenol	74
1,4-Dichlorobenzene	59
N-Nitroso-di-n-propylamine	37
1,2,4-Trichlorobenzene	60
4-Chloro-3-methylphenol	71
Acenaphthene	86
Pentachlorophenol	81
Pyrene	96

(1) This value is an estimate
(2) Tentatively identified; not confirmed with a standard
(3) Not analyzed for this parameter